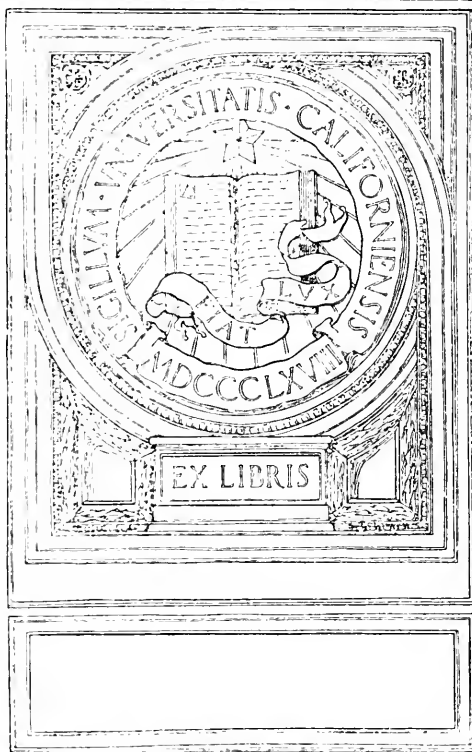




UNIVERSITY OF CALIFORNIA  
AT LOS ANGELES



Digitized by the Internet Archive  
in 2008 with funding from  
Microsoft Corporation









**HANDBOOK**  
TO THE  
**COLLECTION**  
OF  
**BRITISH POTTERY AND PORCELAIN,**  
IN THE  
**MUSEUM OF PRACTICAL GEOLOGY,**  
JERMYN STREET, LONDON, S.W.



LONDON:  
PRINTED FOR HER MAJESTY'S STATIONERY OFFICE,  
BY EYRE AND SPOTTISWOODE,  
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.

**SOLD ONLY AT THE MUSEUM.**

1893.

*Price One Shilling.*

# LIST OF MAPS, SECTIONS, AND OTHER PUBLICATIONS OF THE GEOLOGICAL SURVEY OF ENGLAND AND WALES.

These Maps are those of the Ordnance Survey, geologically coloured, by the Geological Survey of the United Kingdom, and the Superintendence of Sir ARTH. GEIKIE, D.Sc., LL.D., F.R.S., Director General.  
(For Maps, Sections, and Memoirs illustrating Scotland, Ireland, and the West Indies, see "Catalogue.")

## ENGLAND AND WALES.—(Scale one-inch to a mile.)

Maps marked \* are also published as Drift Maps. Those marked † are published only as Drift Maps.

Sheets 8\*, 5, 6\*, 7\*, 8\*, 9, 11 to 22, 25, 26, 30, 31, 33 to 37, 40, 41, 44, 47\*, 64\*, 65†, 69†, 70\*, 83\*, 86\*, price 8s. 6d. each.  
Sheet 4, 5s. Sheets 2\*, 10, 23, 24, 27 to 29, 32, 33, 39, 53, 84†, 85†, 4s. each. 1. of Wight (New Series), 6s.  
Sheets divided into quarters; all at 3s. each quarter-sheet, excepting those in brackets, which are 1s. 6d. each.  
1\*, 42, 43, 45, 46, NW, SW, NE\*, SE, 48, NW†, SW\*, NE†, (SE\*), (49†), 50†, 51\*, 52 to 57, (57 NW), 59 to 63, 66 SW† NW\*, SE†, 67 NT, (8†), 68 E†, (NW\*), SW†, 71 to 75, 76, (N) S, (77 N), 78, 79, NW\*, SW, NE\*, SE\*, 80 NW\*, SW\*, 81 SE\*, 81 NW\*, SW, NE, SE, 82, 83\*, 87, 88, NW, SW\*, NE, SE, 89 NW\*, SW\*, NE, SE\*, 90 (NE\*), (SE\*), 91, (NW\*), (SW), NE\*, SE\*, 92 NW\*, SW\*, NE, SE, 93 NW, SW, NE\*, SE\*, 94 NW†, SW†, (NE†), SE†, 95 NW\*, NE\*, (SE\*), 96 NW\*, SW, NE\*, SE\*, 97 NW\*, SW\*, NE\*, SE, 98 NW, SW, NE\*, SE, 99 (NE\*), (SE\*), 101 SE, NE\*, NW\*, SW\*, 102 NE\*, 103, 104\*, 106 NW\*, SW\*, (NE\*), SE\*, 106 NW\*, SW\*, NE\*, SE\*, 107 SW†, NE\*, SE\*, 108 SW\*, NE\*, SE\*, 109 SW, SE\*, 1 (NW\*), (NE\*), SE\*, SW\*.

## INDEX MAPS.—(Scale 4 miles to 1 inch.)

WALES, &c.—Sheets 9 (1-inch Maps, 37, 38, 40, 41); 10 (35, 36, 42, 43); 14 (57-59); 15 (55, 56, 60, 61); 19 (75-78); 20 (73, 79, 80), 3s. 6d. each.

ENGLAND AND WALES.—Sheets 6 (E. Yorkshire), 7s. 6d.; 12 (London and lower part of Thames Basin), 10s. 6d.; 14 (Torquay to 1. of Wight) 9s.; 15 (Chichester to Hastings), 4s. 6d.

## HORIZONTAL SECTIONS,

1 to 147, England, price 5s. each.

## VERTICAL SECTIONS,

1 to 79, England, price 3s. 6d. each.

## COMPLETED COUNTIES OF ENGLAND AND WALES, on a Scale of one-inch to a Mile.

Sheets marked \* have Descriptive Memoirs.

Sheets or Counties marked † are illustrated by General Memoirs.

ANGLESEY†,—77 N, 78. Hor. Sect. 40.  
BEDFORDSHIRE,—46 NW, NE, SW†, SE†, 52 NW, NE, SW, SE.  
BERKSHIRE,—7\*, 8†, 12\*, 13\*, 34\*, 45 SW\*. Hor. Sect. 59, 71, 72, 80.  
BRECKNOCKSHIRE†,—36, 41, 42, 56 NW, SW, 57 NE, SE. Hor. Sect. 4, 5, 6, 11, and Vert. Sect. 4 and 10.  
BUCKINGHAMSHIRE,—7\* 13\* 45\* NE, SE, 46 NW, SW†, 52 SW. Hor. Sect. 74, 79.  
CAERMARTHENSHIRE†,—37, 38, 40, 41, 42 NW, SW, 56 SW, 57 SW, SE. Hor. Sect. 2-4, 7, 8; and Vert. Sect. 3-6, 13, 14.  
CAERNARVONSHIRE†,—74 NW, 75, 76, 77 N, 78, 79 NW SW. Hor. Sect. 28, 31, 40.  
CAMBRIDGESHIRE†,—46 NE, 47\*, 51\*, 52 SE, 64\*.  
CARDIGANSHIRE†,—40, 41, 56 NW, 57, 58, 59 SE, 60 SW. Hor. Sect. 4, 5, 6.  
CHESHIRE,—73 NE, NW, 79 NE, SE, 80, 81 NW\*, SW\*, 88 SW. Hor. Sect. 18, 43, 44, 60, 64, 65, 67, 70.  
CORNWALL†,—24†, 25†, 26†, 29†, 30†, 31†, 32†, & 33†.  
DENBIGH†,—73 NW, 74, 75 NE, 78 NE, SE, 79 NW, SW, SE, 80 SW. Hor. Sect. 31, 35, 38, 39, 43, 44; and Vert. Sect. 24.  
DERBYSHIRE†,—62 NE, 63 NW, 71 NW, SW, SE, 72 NE, SE, 81, 82, 88 SW, SE. Hor. Sect. 18, 46, 60, 61, 69, 70.  
DEVONSHIRE†,—20†, 21†, 22†, 23†, 24†, 25†, 26†, & 27†. Hor. Sect. 13.  
DORSETSHIRE,—15, 16, 17, 18, 21, 22. Hor. Sect. 19, 20, 21, 22, 56. Vert. Sect. 22.  
ESSEX,—1\*, 2\*, 47\*, 48\*. Hor. Sect. 84, 120.  
FLINTSHIRE†,—74 NE, 79. Hor. Sect. 43.  
GLAMORGANSHIRE†,—20, 36, 37, 41, & 42 SE, SW\*. Hor. Sect. 7, 8, 9, 10, 11; Vert. Sect. 2, 4, 5, 6, 7, 9, 10, 47.  
GLOUCESTERSHIRE,—19, 34\*, 35, 43 NE, SW, SE, 44\*. Hor. Sect. 12 to 15, 59; Vert. Sect. 7, 11, 15, 46 to 51.  
HAMPSHIRE,—8†, 9†, 10\*, 11†, 12\*, 14, 15, 16. Hor. Sect. 80.  
HEREFORDSHIRE,—42 NE, SE, 43, 55, 56 NE, SE. Hor. Sect. 5, 13, 27, 30, 34; and Vert. Sect. 15.  
HERTFORDSHIRE,—1† NW, 7\*, 46, 47\*. Hor. Sect. 79, 120, 121.  
HUNTINGDON,—51 NW, 52 NW, NE, SW, 64\*, 65.  
KENT†,—1† SW & SE, 2†, 3†, 4\*, 6†. Hor. Sect. 77 and 78.  
LANCASHIRE,—79 NE, 80 NW\*, NE, 81 NW, 88 NW, SW†, 89, 90, 91, 92 SW, 93. H. S. 62 to 63, 85 to 87. V. S. 27, 34, 6.  
LEICESTERSHIRE,—53 NE, 62 NE, 63\*, 64\*, 70\*, 71 SE, SW. Hor. Sect. 46, 48, 49, 52, 122, 124, 125.  
LINCOLNSHIRE†,—64\*, 65\*, 69, 70\*, 83\*, 84\*, 85\*, 86\*.  
MERIONETHSHIRE†,—59 NE, SE, 60 NW, 74, 75 NE, SE. Hor. Sect. 26, 28, 29, 31, 32, 35, 37, 38, 39.  
MIDDLESEX†,—1† NW, SW, 7\*, 8†. Hor. Sect. 79.  
MONMOUTHSHIRE,—35, 36, 42 NE, SE, 43 SW. Hor. Sect. 5 and 12; and Vert. Sect. 8, 9, 10, 12.  
MONTGOMERYSHIRE†,—56 NW, 59 NE, SE, 60, 74 SW, SE. Hor. Sect. 26, 27, 29, 30, 32, 34, 35, 36, 38.  
NORTHAMPTONSHIRE,—64\*, 45 NW, NE, 46 NW, 52 NW, NE, SW, 53 NE, SW, & SE, 63 SE, 64.  
NOTTINGHAM,—70\*, 71\* NE, SE, NW, 82 NE\*, SE\*, SW, 83, 86, 87\* SW. Hor. Sect. 60, 61.  
OXFORDSHIRE,—7\*, 13\*, 34\*, 44\*, 45\*, 53 SE\*, SW. Hor. Sect. 71, 72, 81, 82.  
PEMBROKESHIRE†,—38, 39, 40, 41, 58. Hor. Sect. 1 and 2; and Vert. Sect. 12 and 13.  
RADNORSHIRE,—42 NW, NE, 56, 60 SW, SE. Hor. Sect. 5, 6, 27.  
RUTLANDSHIRE†,—this county is wholly included within Sheet 64\*.  
SHROPSHIRE,—55 NW, NE, 56 NE, 60 NE, SE, 61, 62 NW, 73, 74 NE, SE. Hor. Sect. 24, 25, 30, 33, 34, 36, 41, 45, 53, 54, 58; and Vert. Sect. 23, 24.  
SOMERSETSHIRE†,—18, 19, 20, 21, 27, 35. Hor. Sect. 15, 16, 17, 20, 21, 22; and Vert. Sect. 12, 46, 47, 48, 49, 50, 51.  
STAFFORDSHIRE,—54 NW, 55 NE, 61 NE, SE, 62, 63 NW, 71 SW, 72, 73 NE, SE, 81 SE, SW. Hor. Sect. 18, 24, 25, 41, 42, 45, 49, 54, 57, 51, 60; and Vert. Sect. 16, 17, 18, 19, 20, 21, 23, 26.  
SUFFOLK,—47\*, 48\*, 49\*, 50\*, 51\*, 66\* SE\*, 67\*.  
SURREY,—1 SW†, 6†, 7\*, 8†, 12†. Hor. Sect. 74, 75, 76, 78, 79.  
SUSSEX,—4\*, 5†, 6†, 8†, 9†, 11†. Hor. Sect. 73, 75, 76, 77, 78.  
WARWICKSHIRE,—44\*, 45 NW, 53\*, 54, 62 NE, SW, SE, 63 NW, SW, SE. Hor. Sect. 23, 48 to 51; Vert. Sect. 21.  
WILTSHIRE,—12\*, 13\*, 14, 15, 18, 19, 34\*, and 35. Hor. Sect. 15 and 59.  
WORCESTERSHIRE,—43 NE, 44\*, 54, 55, 62 SW, SE, 61 SE. Hor. Sect. 13, 23, 25, 50, 59, and Vert. Sect. 15.



*[Faint, illegible handwriting]*



WEDGWOOD VASE.

[Mounted on Pedestal near Wall Case I.]

Copy, by Josiah Wedgwood, of a large Greek Vase in the British Museum. The original was formerly in the collection of Sir William Hamilton. It belongs to the latest period of vase-painting, known as the style of the Basilicata, and is supposed not to be earlier than B.C. 200. [No. G. 343, p. 104.]

*Presented by the late Apsley Pellatt, Esq.*

**HANDBOOK**  
TO THE  
**COLLECTION**  
OF  
**BRITISH POTTERY AND PORCELAIN,**  
IN THE  
**MUSEUM OF PRACTICAL GEOLOGY,**  
JERMYN STREET, LONDON, S.W.



LONDON:  
PRINTED FOR HER MAJESTY'S STATIONERY OFFICE,  
BY EYRE AND SPOTTISWOODE,  
PRINTERS TO THE QUEEN'S MOST EXCELLENT MAJESTY.

**SOLD ONLY AT THE MUSEUM.**

1893.

*Price One Shilling.*

1920

THE UNIVERSITY OF MICHIGAN

LIBRARY

ANN ARBOR, MICH.



NK  
4085  
L.84R

## P R E F A C E.

The conditions under which a Collection of Pottery and Porcelain gradually grew up in a Museum devoted to Geology and the cognate sciences were fully explained by Sir Henry De la Beche in his Preface to the Catalogue of the Ceramic Collection, originally published in 1855. From that Preface the following passages may be cited:—

“When the sanction of the Treasury was given, in 1835, to the suggestion that advantage should be taken of the progress of the Geological Survey to form collections illustrative of the mineral wealth of the country, and of the application of its various mineral substances to the useful purposes of life, the Geological Survey was engaged upon Cornwall. Among the important substances there obtained were certain granite rocks known as *Cornish* or *China-stone*, and an artificial product named *Cornish* or *China-clay*, substances then largely employed in the composition and manufacture of porcelain and of certain earthenwares, and still more extensively used for these manufactures in the present day. The specimens of these mineral substances obtained for the Museum, then in Craig’s Court, immediately led to collections of others illustrative of the earthenware and porcelain more or less manufactured with them.

“As the progress of the Geological Survey continued, various other British mineral substances, which either had been in former times or were now employed for ceramic purposes, became known; and it was considered desirable to form a collection which should illustrate the composition and manufacture of British pottery and porcelain, from the occupation of Britain by the Romans to the present time . . .

“In forming the collection it became needful to show, to a certain extent, the progress of enamelled colours from early times. Indeed, it would have been difficult to understand that part of the subject without such specimens. Hence those showing the enamel colours found at Nineveh and Babylon, the examination of which enabled Dr. Percy, metallurgist to the Museum, to point out that certain metallic oxides and their combinations were systematically used in enamel colours many centuries before the periods usually assigned. In like manner certain Greek vases became valuable, as also specimens from Italy, commonly known as Majolica, and from other countries, in obtaining knowledge applicable to a proper consideration of the advance made in the composition and manufacture of British pottery and porcelain.”

13042587

After the death of Sir Henry De la Beche the Ceramic Department was greatly extended by the exertions of the Curator, the late Mr. Trenham Reeks. In forming and developing the collection, the technological rather than the artistic side of the subject has been steadily kept in view; and it is consequently believed that though many of the specimens may be less elegant and intrinsically valuable than those in other collections, yet the Ceramic Department, as a whole, is probably unrivalled, so far, at least, as British products are concerned, in educational and scientific value.

A detailed Catalogue of the Pottery and Porcelain was originally published in 1855; a second edition, greatly amplified, appeared in 1871; and a third in 1876. Experience has shown, however, that the majority of visitors do not require an inventory of the specimens in this or in any other department of the Museum. Instead, therefore, of issuing new Catalogues, or new editions of old ones, it is intended to publish a series of readable "Handbooks" to the several departments; and the present Handbook to the Ceramic Collection may be regarded as the first of the new series. It has been prepared by the Curator, Mr. F. W. Rudler, who has retained most of the descriptive matter of the old Catalogues, modifying and enlarging it where necessary, so as to form at once a guide to the Collections and a concise manual on the subject of British Pottery and Porcelain.

ARCH. GEIKIE,  
Director.

Museum of Practical Geology,  
28, Jermyn Street, London, S.W.,  
10th February 1893.

# CONTENTS.

---

	PAGE.
INTRODUCTION - - - - -	1
General remarks on ceramic art - - - - -	1
Early history of pottery - - - - -	2
Composition and origin of clays - - - - -	4
Composition of the body or paste - - - - -	7
Physical characters of ceramic pastes - - - - -	8
Chinese porcelain - - - - -	9
Introduction of Oriental porcelain into Europe - - - - -	12
First European manufactory of hard porcelain at Meissen in Saxony - - - - -	12
Origin of other continental porcelain works - - - - -	14
Early English porcelain works - - - - -	15
Cookworthy's discovery of kaolin - - - - -	18
RAW MATERIALS - - - - -	19
Kaolin or China clay, &c. - - - - -	25
China-stone - - - - -	28
Flint - - - - -	29
MANUFACTURE OF EARTHENWARE AND PORCELAIN - - - - -	30
Manufacture of earthenware - - - - -	30
" Dip ware " - - - - -	32
Manufacture of porcelain - - - - -	33
Potter's wheel - - - - -	35
GLAZES - - - - -	36
Egyptian glazes or enamels - - - - -	37
Assyrian and Babylonian glazes - - - - -	40
Indian enamels or glazes - - - - -	41
Greek glazes - - - - -	41
Lead glazes - - - - -	47
Tin glazes or enamels - - - - -	49
Majolica ware - - - - -	50
Palissy ware - - - - -	53
Delft ware - - - - -	54
Felspathic glazes - - - - -	55
Salt glaze - - - - -	57
Smearing - - - - -	58
COLOURS - - - - -	58
Lustres - - - - -	61
ANCIENT BRITISH POTTERY - - - - -	63

	PAGE.
ROMAN POTTERY - - - - -	64
Red lustrous ware (Samian) - - - - -	64
Red lustrous ware found in London - - - - -	67
Red lustrous ware found at Castor, Colchester, &c. - - - - -	70
Other kinds of Roman pottery found in England - - - - -	70
Roman pottery from the Rhine for comparison with that found in England - - - - -	79
Aretine ware - - - - -	82
ANGLO-SAXON POTTERY - - - - -	82
MEDIEVAL POTTERY USED IN BRITAIN - - - - -	83
STAFFORDSHIRE POTTERY AND PORCELAIN - - - - -	87
Slip ware - - - - -	91
Agate ware - - - - -	93
Tortoise-shell ware - - - - -	93
Elers' ware - - - - -	94
Salt-glazed ware - - - - -	96
Wedgwood ware - - - - -	100
Wedgwood cameos, &c. - - - - -	105
Wedgwood porcelain - - - - -	105
Old Staffordshire ware exclusive of Wedgwood ware - - - - -	106
Modern Staffordshire ware - - - - -	110
BOW PORCELAIN - - - - -	113
CHELSEA PORCELAIN - - - - -	117
DERBY PORCELAIN - - - - -	122
PINXTON PORCELAIN - - - - -	127
PLYMOUTH PORCELAIN - - - - -	127
BRISTOL PORCELAIN - - - - -	131
Bristol Delft and earthenware - - - - -	136
Brislington lustre ware - - - - -	139
ROCKINGHAM PORCELAIN AND EARTHENWARE - - - - -	140
WORCESTER PORCELAIN - - - - -	142
SHROPSHIRE POTTERY AND PORCELAIN - - - - -	146
SWANSEA EARTHENWARE AND PORCELAIN - - - - -	148
NANTGARW PORCELAIN - - - - -	150
LEEDS POTTERY - - - - -	151
DON POTTERY - - - - -	154
CASTLEFORD POTTERY - - - - -	154
FERRYBRIDGE POTTERY - - - - -	154
PLACE'S WARE - - - - -	155
LIVERPOOL POTTERY AND PORCELAIN - - - - -	155
Miscellaneous examples of old English Pottery - - - - -	158
NEWCASTLE AND SUNDERLAND POTTERY, &c. - - - - -	160
NOTTINGHAM EARTHENWARE, &c. - - - - -	162
LOWESBY POTTERY - - - - -	163
"YARMOUTH POTTERY," &c. - - - - -	164
LOWESTOFT POTTERY AND PORCELAIN - - - - -	164
WROTHAM POTTERY - - - - -	165
CADBOROUGH POTTERY - - - - -	165

	PAGE.
BISHOP'S WALTHAM POTTERY - - -	- 166
BRANKSEA POTTERY - - -	- 166
WATCOMBE TERRA COTTA - - -	- 166
FULHAM POTTERY - - -	- 167
MORTLAKE POTTERY - - -	- 168
ISLEWORTH POTTERY - - -	- 169
LAMBETH AND VAUXHALL POTTERY - - -	- 169
Lambeth ornamental stone ware - - -	170
DELFT WAR (BRITISH AND FOREIGN) - - -	- 171
BELLEEK (IRISH) PORCELAIN, &c. - - -	- 174
PORTO-BELLO POTTERY - - -	- 175
FOREIGN POTTERY AND PORCELAIN - - -	- 175
INDEX - - -	- 176

---

## LIST OF ILLUSTRATIONS.

Fig.		PAGE.
	Frontispiece.—Large Wedgwood Vase after the antique, described at . . . . .	104
1.	Potter's Wheels as used by the ancient Egyptians . . . . .	36
2.	Egyptian Figure of Ptah-Sekeri-Hesar . . . . .	38
3.	Egyptian Figure of Ta-hur . . . . .	38
4.	Babylonian Brick with cuneiform inscription . . . . .	40
5.	Ancient Indian Enamel . . . . .	41
6.	Early Greek Vase found at Vulci . . . . .	42
7.	Greek Hydria from Vulci . . . . .	42
8.	Greek Amphora from Vulci . . . . .	43
9.	Greek Amphora from Vulci . . . . .	43
10.	Greek Amphora from Ruvo . . . . .	43
11.	Greek Oxybaphon from Ruvo . . . . .	43
12.	Greek Cenochoë from the Campania . . . . .	44
13.	Greek Cenochoë from the Campania . . . . .	44
14.	Upper View of a Greek Cylix from Vulci . . . . .	44
15.	Under View of ditto . . . . .	45
16.	Upper View of a Greek Cylix from Vulci . . . . .	45
17.	Under View of ditto . . . . .	45
18.	Upper View of a Greek Cylix from Ruvo . . . . .	46
19.	Under View of ditto . . . . .	46
20.	Upper View of a Greek Cylix from Nola . . . . .	47
21.	Under View of ditto . . . . .	47
22.	Etruscan Cantharos . . . . .	47
23.	Etruscan Scyphos . . . . .	47
24.	Majolica Plate of Siena manufacture . . . . .	53
25.	Section exposed in Cannon Street, London (1851), showing the position in which the Roman ware was found . . . . .	67
26.	Vase in Roman red lustrous ware, found in London . . . . .	68
27.	Fragment of Vase in Roman red lustrous ware, found in London . . . . .	68
28.	Fragment of Vase in Roman red lustrous ware, found in London . . . . .	68
29.	Acetabulum in Roman red lustrous ware, found in London . . . . .	69
30.	Fragment of Vessel in Roman red lustrous ware, found in London . . . . .	69
31.	Mortarium in Roman red lustrous ware, found in London . . . . .	69
32.	Fragment of Cup of Aretine ware, found in London . . . . .	69

Fig.	PAGE.
33. Mark of Human Foot stamped on Aretine ware	- 69
34. Potter's Mark on Roman red lustrous ware	- 69
35. Potter's Mark on ditto	- 69
36. Catinus in Roman red lustrous ware, found in London	- 69
37. Vase in Roman red lustrous ware, found at Castor, Northamptonshire	- 70
38. Fragment of Bowl in Roman red lustrous ware, found at Castor	- 70
39. Roman Potter's Kiln at Castor	- 71
40. Another Roman Potter's Kiln at Castor	- 71
41. Cake of Roman Glass or Frit from Castor	- 71
42. Roman Vase found at Castor	- 72
43. Roman Vase found at Castor	- 72
44. Roman Vase found at Castor	- 72
45. Roman Vase found at Castor	- 72
46. Roman Vase found at Castor	- 72
47. Roman Vase found at Castor	- 73
48. Roman Unguentarium found at Castor	- 73
49. Roman Unguentarium found at Castor	- 73
50. Roman Unguentarium found at Castor	- 73
51. Fragment of Roman Vase, found at Castor	- 73
52. Fragment of Roman Pottery from Castor	- 73
53. Fragment of Roman Pottery from Castor	- 73
54. Fragment of Roman Pottery from Castor	- 73
55. Fragment of Roman Pottery from Castor	- 73
56. Fragment of Roman Pottery from Castor	- 73
57. Roman Vase found at Winchester	- 74
58. Roman Vase found in London	- 74
59. Roman Vase found in London	- 74
60. Roman Vase found in London	- 75
61. Roman Amphora found in London	- 75
62. Roman Amphora found in London	- 76
63. Roman Amphora found in London	- 76
64. Roman Amphora found in London	- 76
65. Roman flattened Amphora found in London	- 77
66. Roman Mortarium, found in London	- 77
67. Roman Lamp, found in London	- 77
68. Roman Lamp, found in London	- 77
69. Roman Lamp, found in London	- 77
70. Roman Terra-cotta Toy, found in London	- 77
71. Roman Brick, found in London	- 78
72. Roman Flue-brick, found in London	- 78
73. Bowl in Roman red lustrous ware from Cologne	- 79
74. Vase in Roman red lustrous ware from the Rhine	- 80
75. Patena in Roman red lustrous ware from the Rhine	- 80
76. Roman Vase from the Rhine	- 81
77. Roman Vase from the Rhine	- 81

Fig.	PAGE.
78. Roman Vase from the Rhine - - -	81
79. Roman Lamp from the Rhine . - -	81
80. Cup in Aretine ware - - -	82
81. Under View of ditto - - -	82
82. Early English Pilgrim's Bottle found in London -	84
83. Early English Jug, found in London - -	84
84. Early English Jug, found in London - -	84
85. Early English Costrel, found in London - -	85
86. Old Staffordshire Butter-pot - - -	88
87. Old Staffordshire Tyg - - -	91
88. Old Staffordshire, or Wrotham, Candlestick -	91
89. Old Staffordshire Dish by Thomas Toft - -	92
90. Tea-pot in Tortoise-shell ware - - -	94
91. Piggin in Elers' red ware, with ladle - -	95
92. Coffee Cup and Saucer in Elers' red ware -	95
93. Model of Body of Tea-pot in stoneware - -	97
94. Model of Body of Jug in stoneware - - -	97
95. Saucer in drab and white salt-glazed ware -	98
96. Seau in salt-glazed ware - - -	98
97. Tea-pot in salt-glazed ware - - -	99
98. Plate in red-printed salt-glazed ware - -	99
99. Puzzle-jug by John Wedgwood, 1691 - -	101
100. Butter boat in Josiah Wedgwood's Queen's ware -	102
101. Vase in Wedgwood's black basaltos or Egyptian ware -	102
102. Vase in Wedgwood's Egyptian ware - -	103
103. Lamp in Wedgwood's Egyptian ware - -	103
104. Plaque in Wedgwood's jasper-ware, with the Sacrifice of Iphigenia in cameo-work - - -	105
105. Vase in Neale's ware - - -	107
106. Vase in Spode's ware - - -	109
107. Wine-cooler in Minton's ware - - -	111
108. Bust of Juno in Parian by Copeland - -	111
109. Vase in Parian by Messrs. Boote - - -	112
110. Vase in Modern Wedgwood ware - - -	112
111. Screen of Minton's Enamelled Bricks - -	113
112. New Canton Inkstand, 1751 - - -	114
113. Fragment of Bow Biscuit with May-flower pattern -	115
114. Figure of a Female in Bow porcelain - -	116
115. Figure of a Carpenter in Chelsea porcelain -	120
116. Vase in Chelsea porcelain - - -	121
117. Cup and Saucer in Chelsea-Derby porcelain -	123
118. Cup and Saucer in Crown-Derby porcelain -	124
119. Cup and Saucer in Crown-Derby porcelain -	125
120. The King's Vase in Derby porcelain - -	126
121. Salt-cellar in Plymouth porcelain - -	130
122. Mug in Plymouth porcelain - - -	130
123. Plate in Plymouth pottery - - -	130



Fig.		PAGE.
124.	Bristol Mark over a Dresden Mark - - -	135
125.	Delft Plate made at Bristol - - -	136
126.	Mark on Bristol Delft plate - - -	136
127.	Worcester Jug printed with Bust of the King of Prussia 1757 - - -	144
128.	Scent Bottle in Worcester porcelain - - -	145
129.	Cup and Saucer in Salopian ware - - -	147
130.	Sugar-basin in Swansea ware - - -	148
131.	Cup in Place's ware - - -	155
132.	Mug in Old English delft ware, 1631 - - -	172



## CERAMIC SERIES.

---

### INTRODUCTION.

*General Remarks on Ceramic Art.*—It has been well remarked that there is no branch of industry viewed in reference to its history, its theory, and its practice, which offers more that is interesting, with regard alike to its economic application and to its scientific aspect, than the ceramic or plastic art: none affording products more simple and varied, more easy of manufacture, and, notwithstanding their fragility, more durable.\*

It would appear in vain to search for any centre whence this art, like many other branches of human industry, may have radiated among the early nations of mankind. At the same time certain peculiar methods of working the materials employed in the art can readily be traced to their respective sources; and it may be often seen that a nation, spreading by conquest or by colonisation, has carried with it certain peculiarities of the ceramic art.

The plasticity of clays after rain and their subsequent desiccation in countries where evaporation is rapid could not fail to attract attention to the soft state of such clays at one time, and to their comparative hardness at another. We should therefore expect that sun-dried portions of clay would be early used for building purposes in regions generally dry, especially where building stones were scarce or even altogether absent.

The alluvial deposits of Mesopotamia and of the valley of the Nile were utilized at a very early period in the preparation of sun-dried bricks; and such crude materials are still used for domestic architecture in Egypt and elsewhere. According to Professor Maspero, "the ordinary Egyptian brick is a mere oblong block of mud mixed with chopped straw and a little sand and dried in the sun."†

Sun-dried bricks, and even shapeless masses of mud, are in like manner extensively employed in Persia and other eastern countries for the construction of houses, forts, and defensive walls. "Not only villages," says Mr. Simpson when speaking of

---

\* Alexandre Brongniart. "Traité des Arts Céramiques; ou des Poteries considérées dans leur Histoire, leur Pratique, et leur Théorie." Paris, 1844. (Preface, tome I.)

† "Egyptian Archaeology." By G. Maspero, D.C.L. Translated from the French by Amelia B. Edwards. Second edition, 1889, p. 3.

Persia, "but large towns are built of mud or sun-dried brick."\* Similar constructive materials are common in South America and along the Pacific coast northwards as far as San Francisco, where the unburnt bricks pass under the Spanish name of *adobes*, or its corrupted form *dobies*. Even in so humid a climate as that of England, cottage walls have been built—like the "cob" walls of Devonshire—of unbaked mud, or argillaceous matter, mixed with chopped straw.†

However serviceable sun-dried bricks might be in a comparatively rainless country, it is obvious that the use of clay would be greatly extended when it came to be recognised that the material could be further hardened by artificial heat. The hardening of clays by fire could hardly fail to be observed at an early date, since any form of moulded clay, when subjected to the action of strong heat, would readily show the induration which could be thus produced. The hardened state of such clays would readily suggest the extension of their use to the manufacture of domestic vessels, especially for such as might be advantageously employed over fires. No doubt in regions where the vegetation afforded gourds and similar fruits fit for use as domestic vessels, the desire to obtain those of baked clay, except for use over fire, might be checked; while elsewhere the horns and skins of animals might be often found to serve sufficiently well for the like purposes. Nevertheless, the obvious convenience of baked clays for vessels required to withstand the effects of fire, and the desire for obtaining those of larger size than could be obtained from horns and gourds, would eventually produce an extended demand for the potter's ware.‡

*Early History of Pottery.*—Whatever may have been the origin of the manufacture of pottery, and however the art may have been spread, it was certainly known and practised in times beyond the reach of historical records. There is abundant evidence afforded by monuments of the later Stone Age to show that the art was cultivated among the peoples of Western Europe at a time when they were apparently ignorant of the use of metals, excepting perhaps gold.

Several instances have been recorded of the discovery of fragments of pottery in association with relics of the earlier stone age, or *palæolithic* period; but in most of these cases the conditions of the discovery seem to leave room for much doubt. One of the best known examples of pottery reputed to be of palæolithic age is the urn, which was found in a fragmentary state by M. Dupont at the Trou du Frontal, and is now exhibited in the Royal Natural History Museum in Brussels. The Trou du Frontal is a sepulchral rock-shelter in Carboniferous Limestone

---

\* "Mud, a Material in Persian and Eastern Architecture." By William Simpson. *Journ. Soc. Arts*, vol XI., 1892, p. 697.

† On Cob Walls, see *Quart. Rev.*, vol. LVIII., 1837, p. 524.

‡ On the possible origin of the potter's art see Dr. E. B. Tylor's "Researches into the Early History of Mankind," 3rd edition, 1878, p. 270.

in the valley of the Lesse, near Dinant; and the potsherds were found at the entrance to the cave under conditions which led M. Dupont to conclude that they might be referred to the Reindeer period.\* Few archaeologists, however, are disposed to regard this pottery as affording evidence of a knowledge of fictile art at so early an epoch. "No fragments of metal or pottery," says Sir John Lubbock, "have yet been found which can be referred with confidence to the Reindeer period."† Speaking of the palæolithic cave-men, Professor Boyd Dawkins, in like manner, says, "there is no reason to suppose that they used vessels of pottery."‡

But whilst little or no satisfactory evidence of the existence of palæolithic pottery has yet been cited, there can be no doubt as to the widespread knowledge of fictile art in the succeeding period, known as the *neolithic* age. Many of the pile-buildings in the Swiss lakes, which may be referred to this later stone period,—a period characterised by the use of polished stone implements, and the absence of both bronze and iron,—have yielded among their relics numerous remains of earthenware vessels, spindle-whorls, and other objects. As might be expected, these early specimens indicate the rude state of the art. The paste is coarse, and generally contains embedded grains of quartz, or fragments of shell, while the objects have evidently been made by hand, without the aid of the potter's wheel, and appear to have been very imperfectly hardened by fire. The ornamentation of such ware is almost confined to simple incised lines, produced sometimes by mere scratching with the finger nail, and sometimes by a thong twisted round the moist paste. Fragments of coarse hand-made pottery have also been found, associated with stone implements, in the Danish kitchen-middens, or heaps of refuse-shells. But while only the rudest forms of ware have been brought to light from these sources, it is to be noted that early specimens of the potter's art, of a much finer description and more carefully worked, have been discovered in many tumuli or burial mounds, which from their contents have been assigned by archaeologists to the newer stone epoch or neolithic age.

In later times, when the use of *bronze* became general, considerable advance must have been made in the ceramic art, as testified by the remains found among the later Swiss lake-dwellings, and in tumuli of the bronze age in this country. Not only has the clay in these cases been more carefully prepared, but the forms into which it is worked have become more varied, and the style of ornamentation more refined. Few, if any, of the specimens, however, show signs of having been turned on the potter's wheel, and it is generally believed that this mechanical

\* "L'homme pendant les Ages de la Pierre dans les Environs de Dinant-sur-Meuse." Par M. E. Dupont. Bruxelles. 2nd. ed. 1872, p. 198.

† "Prehistoric Times." By Sir John Lubbock, Bart, M.P. 4th ed. 1878, p. 338.

‡ "Early Man in Britain." By W. Boyd Dawkins, M.A., F.R.S. 1880, p. 209.

contrivance, ancient as it undoubtedly is, was practically unknown during those early phases of civilisation represented by the so-called ages of stone and bronze.

A very fine collection of prehistoric pottery, mostly of sepulchral character, disinterred from tumuli in the North of England, by Canon Greenwell, will be found in the British Museum.\*

The high antiquity of the ceramic art is attested not only by such pottery as that mentioned above, but also by the constant discovery of remains of pottery among the ruined cities and tombs of ancient nations, with whose history we are more or less acquainted; and also by early records, such as those of the Scriptures, which afford frequent references to the art, and at the same time show that it was formerly held in high esteem.†

It should be noted that notwithstanding the high antiquity of the potter's craft and the apparent simplicity of fictile industry in its cruder phases, there have existed in modern times many savage races who, before contact with civilising influences, were absolutely ignorant of even the simplest stages of the art. Among peoples who were formerly without any knowledge of pottery, may be mentioned the Australians, the Maories of New Zealand, the Andamanese, the Veddahs of Ceylon, and the Polynesians of Tahiti.

*Composition and Origin of Clays.*—Clays consist of finely-divided plastic materials, derived either from the chemical alteration of certain felspathic and other aluminous minerals or from the mechanical disintegration of pre-existing rocks of an argillaceous character. The purest clay is that known under the Chinese name of *Kaolin*;‡ it is also called *China-clay* from its employment in the manufacture of china or porcelain, while in this country it is likewise termed *Cornish clay*, since it is obtained chiefly from quarries in Cornwall. This pure clay is derived from the decomposition of some of the minerals known as *felspars*,§ generally from that particular kind called

\* For description of this pottery see "British Barrows." By Canon Greenwell and Professor Rolleston. 1877.

† In the genealogy of the tribe of Judah, a family of potters is mentioned as working for the king. 1 Chron. iv. 23.

‡ The term *kaolin* is said to be derived from *Kaouling* ("lofty ridge,") the name of a hill east of King-te-chin, whence some of the material is obtained.

§ Although analyses show slight variations in the composition of these felspars, the following may be taken to fairly represent their general composition:—

—	Silica.	Alumina.	Potash.	Soda.	Lime.	Magnesia.
Orthoclase <sup>a</sup> - - -	65·24	18·57	14·02	1·25	0·34	0·10
Albite <sup>b</sup> - - -	68·75	18·79	1·21	10·90	0·51	0·09 <sup>c</sup>
Oligoclase <sup>c</sup> - - -	63·94	23·71	2·17	7·66	2·52	—
Labradorite <sup>d</sup> - - -	53·89	27·66	1·28	4·92	8·28	—
Anorthite <sup>e</sup> - - -	45·14	32·11	0·22	1·06	18·32 <sup>f</sup>	—

<sup>a</sup> From Baveno, analysed by Abich.

<sup>b</sup> From Warnbrunn, Silesia, by Rammelsberg.

<sup>c</sup> From Hecla, by S. Von Waltershausen.

<sup>d</sup> From the Riesengebirge, by Lohmeyer.

<sup>e</sup> From Oberstein, by Delesse.

<sup>f</sup> With 0·54 of protoxide of iron.

<sup>g</sup> With 0·77 of protoxides of nickel and cobalt, and 0·3 of water.

It is, perhaps, right to observe that although the several felspars are commonly

*orthoclase*,\* which is the common felspar in most granite rocks. The orthoclase may be regarded as a double silicate of aluminium and potassium. Exposed to the action of waters containing carbonic acid in solution, such as the natural waters which are constantly flowing over the surface of the rocks or circulating through them, the felspar may readily suffer decomposition, its potash being removed as a soluble carbonate, whilst the insoluble silicate of aluminium left in a hydrated condition, may form a pure white clay, or kaolin.† Most clays, however, contain, in addition to the hydrous silicate of aluminium, a variable proportion of free silica and of other foreign substances in a state of mechanical association. These substances greatly affect the manner in which a clay behaves on exposure to heat. Thus, the presence of compounds containing potash, lime, or oxide of iron confers upon it a greater or less degree of fusibility, while a larger proportion of silica renders it refractory.

Although the kaolinisation of felspar may be effected by ordinary weathering, yet in most cases the alteration has probably been brought about by subterranean rather than by superficial agencies. It is notable that in Cornwall, where the decomposition of the granite has proceeded to great depths, the kaolin is usually accompanied by minerals containing compounds of fluorine and boron; and a similar association has been observed in other china-clay districts. The characteristic associates of the altered felspars in the clay-yielding granites are such minerals as tourmaline, lepidolite, topaz, apatite, and fluor-spar.

As far back as 1824, Leopold von Buch suggested that certain kaolins had probably resulted from the action of compounds containing fluorine, rising from deep-seated subterranean sources, and attacking felspathic rocks.‡ These views were modified and extended by M. Daubrée, who supported them by ingenious experimental evidence.§ It is worth noting too, that Mr. J. H. Collins has effected the kaolinisation of felspar by means of hydrofluoric acid.||

spoken of as so many separate species, it is probable that only a few of them are specifically distinct. Thus, according to the views of Tschermak, the so-called species oligoclase and labradorite are merely isomorphous mixtures in different proportions of albite and anorthite.

\* This term has reference to the existence of two cleavages in the mineral at right angles to each other.

† The term *kaolinite* has been applied by Messrs. S. W. Johnson and J. M. Blake to a definite chemical compound, occurring as microscopic six-sided pearly scales, and supposed to represent the pure basis of kaolin. It has the formula  $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ , corresponding to Silica, 46.5, alumina 37.5, water 14 per cent. *Amer. Journ. Science*. (2nd series). Vol. xliii., 1867, p. 351. See also a paper "On Kaolinite." By Allan Dick. *Mineralog. Mag.*, vol. viii., 1889, p. 15.

‡ "Ueber den Thüringer Wald." *Min. Taschenbuch*, 1824, p. 437; *Gesammelte Schriften*, vol. iii., 1877, p. 186.

§ "Études synthétiques de Géologie expérimentale." Par A. Daubrée. Paris, 1879, p. 64.

|| "On the Nature and Origin of Clays: the composition of Kaolinite." *Mineralog. Mag.*, vol. vii., 1887, p. 205; also *Journ. Soc. Arts*, vol. xxlv., 1876, p. 572.

The method of working kaolin and preparing it for the use of the potter will be described in a subsequent chapter, dealing with the raw materials employed in ceramic manufactures (p. 26).

When the remains of the decomposed felspars are washed by natural agencies into localities where they become mingled with other earthy matters in a finely-comminuted state, or when the clays have been derived from a rock which contains decomposing hornblende, the resulting material is no longer white, but is variously coloured and more or less impure. Even when we suppose the purer varieties to have been deposited in the first instance, and to have formed distinct beds in previous geological times, it is easy to see that these clays may be again removed by atmospheric influences, rivers, and other abrading agents, and thus be rendered impure by the admixture of a variety of substances brought into intimate association with them by these causes.

The clays yielded by the Bovey Tracey beds, near Newton Abbot, in Devonshire, have probably been derived, at least in great part, from the kaolinised felspar of the Dartmoor granite. Sir H. T. de la Beche, referring to these clays, says that they "appear to have been formed naturally much in the same manner as is now done artificially in Cornwall and Devon, though on a larger scale; decomposed granite having been washed down from Dartmoor into a lake or estuary, so that while the grosser particles were first lodged at its higher end, nearest the granite, the fine sediment was accumulated at the lower part."\*

The Bovey clay, which has been worked since about the year 1730,† is largely used in the British potteries under the name of *Teignmouth clay* (see also p. 27).

Another clay extensively employed in the potteries of this country is the well-known *Poole clay*, so termed from being shipped at Poole in Dorsetshire, though chiefly raised in the neighbourhood of Wareham. This is an example of a tolerably pure clay (that is, one containing a large proportion of silicate of aluminium, with free silica but without injurious ingredients), which has been accumulated far from any decomposing crystalline rocks, such as granites, porphyries, and the like. It is known also in the potteries as "blue clay." Its decomposed felspathic matter may readily have been derived from other beds, such as those of many sandstones, in which that matter may have been disseminated. Prior-existing clays may also have been broken up and re-deposited.

It is not known when Poole clay was first worked. By an Order in Council of 1666, arising out of a dispute between Wareham and Poole, it is directed that no dues were to be paid on "tobacco-pipe clay." In an Act of Parliament obtained by

---

\* "Report on the Geology of Cornwall, Devon, and West Somerset," by Sir H. T. de la Beche, F.R.S., 8vo., 1839.

† Lyson's *Magna Britannia*, Devonshire, p. cxcxi.



Poole in 1756, the clay is termed "tobacco-pipe clay." Hutchins, in his *History of Dorsetshire*, published in 1774, mentions this clay as the chief article sent from "the Key at Wareham," and in 1796 about 10,000 tons of it were exported annually.\* (See also p. 27.)

The Poole clay is referred by geologists to that part of the Eocene, or Lower Tertiary strata, known as the Lower Bagshot beds. Numerous remains of land-plants, suggesting a sub-tropical flora, have been obtained from these clays. The Bovey clays, formerly regarded as Miocene, are placed by Mr. J. Starkie Gardner, also in the Bagshot series, at a slightly higher level than that of the leaf-beds of Bournemouth.

Many of the clays termed *pipe-clays*, from being used in the manufacture of tobacco pipes, appear to have been derived, not directly from the decomposition of crystalline rocks, but rather from the disintegration of pre-existing stratified rocks. Mr. Maw has suggested that some of the finer white clays of the Lower Tertiaries may have been derived from the Chalk. (See p. 21.)

The artificial preparation of selected clays for pottery otherwise than by well washing and mixing them, does not appear to have been practised in Europe until long after it was familiar to the Chinese, and indeed seems to have been adopted in European countries only in the early part of the eighteenth century, in order to produce a paste or body in imitation of that of Chinese porcelain.

*Composition of the body or paste.*—The chief substance entering into the composition of the *body or paste* of all pottery and porcelain is silicate of aluminium, generally associated with certain alkaline and earthy silicates, and with more or less free silica. In the paste after firing, the amount of silica varies from 40 to nearly 80 per cent. The silicates are introduced in the form of various clays, and in the case of porcelain, partly in the form of china-stone, whilst the free silica is generally supplied by addition of calcined flints.

Magnesia has sometimes been introduced into certain pastes, chiefly in the form of the mineral termed *steatite* or *soap-stone*; it may often, however, be found in small quantity in clays, particularly where the beds of clay contain products

---

\* The following is an extract from Hutchins' *History of Dorset* (edition 1796). "Good tobacco-pipe clay is dug round this town (Wareham) at Arne Hill, Heneger Hill, Norden, &c. It formerly sold at 50s. a ton, but now at 14s. or 15s. Nearly 10,000 tons are annually exported to London, Hull, Liverpool, Glasgow, &c., but the most considerable part to Liverpool for the supply of the Staffordshire potteries, and to Selby for the use of the Leeds potteries. The principal pits are on Norden and Witch farms, the former belonging to William Moreton Pitt, and the latter to John Calcraft, Esq., and the clay taken from the same is in great repute with the Staffordshire and Yorkshire potteries from its peculiar excellence, and being the principal ingredient in the ware commonly called Staffordshire ware, so universally in use in this kingdom as well as in many other parts of Europe." In 1892 upwards of 80,000 tons of clay were sent from Poole.

derived from districts in which magnesian limestones may be present.

The old Worcester paste contained magnesia freely introduced in the shape of hard and soft varieties of "soapy rock" from Mullion in Cornwall; but these steatitic minerals gave way to the use of bone-ash. Calcined ox-bones are still largely used in the paste of soft porcelain. Lime is also a constituent of many pastes, and is usually introduced either as chalk or as gypsum.

Judging from the analyses which have been made of the ancient pottery of Asia Minor, Egypt, Greece, Italy, and other advanced nations of antiquity, the pastes, or bodies, employed by them appear to have been little else than natural clays, selected for their fitness to the purposes for which they were intended. It has, indeed, been inferred that for the red ware some form of peroxide of iron was introduced into the paste, and certainly in some of the bodies this oxide is found in somewhat considerable quantity; but it should be recollected that certain clays naturally contain a large proportion of this substance. In the paste of the celebrated Greek pottery of the Campania there is often much peroxide of iron. The mean of eight analyses of this pottery (differing but little from one another) by M. Salvétat at Sèvres, was as follows:—Silica, 55·88 per cent., alumina, 18·88 per cent., peroxide of iron, 15·80 per cent., lime, 7·48 per cent., magnesia, 1·63 per cent.

*Physical characters of ceramic pastes.*—Confining our attention to natural clays, we may regard the bricks and pottery made from them as varying in texture from those which are simply dried in the sun to those which are highly fired or baked in kilns at a considerably elevated temperature. In the former case the brick or piece of pottery is merely a dry piece of clay, the particles cohering slightly together; but in the latter case a partial chemical change has been effected, which however slight in some instances, is yet sufficient to produce firm cohesion between the particles, so that when the piece which they collectively form is struck, a bell-like sound is emitted.

It will be obvious that sun-dried bricks or pottery, being merely pieces of desiccated clays, hardened only by the loss of hygroscopic water, may be again reduced to the state of soft clay by the addition of the water lost by drying. Buildings constructed of adobes, or sun-dried bricks, suffer disastrously from the effects of heavy rains. This, however, is not the case with baked bricks or pottery, inasmuch as during the process of firing the chemical composition of the clay is altered, and the constitutional water is more or less completely expelled, thus leaving the silicates almost or even entirely anhydrous. It generally requires, however, a red heat for the perfect dehydration of a clay. As the water cannot be again introduced by the mere mechanical act of absorption, it follows that with well-baked bricks or pottery mixture of their powder with water does not produce a plastic substance resembling the original

clay from which the bricks or pottery were formed. The porosity of pottery may depend either on the amount of firing, an incomplete baking tending to retain a portion of the clay in its natural state; or on the composition of the clay, together with the amount of heat employed.

It is also necessary to study the shrinkage of clays consequent upon drying and firing, since in this respect different clays vary materially. The "fat" clays, as they are termed, those which are very unctuous and plastic, from containing little gritty matter and much water, usually shrink very considerably; while those which are "dry" or "lean," that is, more harsh to the touch from usually containing disseminated grains of sand and less water in the same bulk, better keep to the size and shape artificially given to them. Thus a piece composed of the first kind will commonly get out of shape and crack, while one made of the latter may retain its general form. Porcelain suffers much more than common earthenware, and in some kinds of porcelain the contraction may amount to as much as 25 per cent., a serious diminution of bulk, for which the modeller of figures in porcelain has to make due allowance in the course of his work.

The shrinkage arises mainly from two causes; first, from the loss of water, which in a highly plastic paste may cause contraction to the extent of upwards of 15 per cent.; and, secondly, if the body be formed of readily-fusible substances, a further diminution of bulk arises from the closer juxtaposition of the component particles by incipient fusion; and this amounts frequently to from 10 to 15 per cent. From these causes it becomes essential that in pottery all portions of the clay employed should be of the same kind or composition, as otherwise the shrinkage would be unequal, and the vessel in baking would be distorted and cracked from that cause alone. In the employment of natural clays, therefore, it becomes needful to thoroughly knead and bake them, a process well understood by the ancient nations, judging from their better kinds of pottery.

Although natural clays may frequently have been employed singly, it could scarcely happen but that occasional experience, and often, probably, original design, arising from known variations in their plastic or other characters, induced the potters to mingle certain of them together, especially in districts where both "fat" and "dry" or "lean" kinds might be found near each other. In the operation of firing, the potters probably found such variations of fusibility in the clays employed as to lead them to mingle two or more together, so that a highly fusible paste would be modified by one found from experience to be more refractory.

*Chinese porcelain.*—Artificially prepared clays seem to have been first employed by the Chinese for their pottery or porcelain. The date at which the use of these prepared clays commenced in China appears uncertain. Indeed how far the clays may have been first used in their natural state, as found in the vicinity of

decomposed granite rocks, the natural process by which they were formed being afterwards artificially imitated, seems also uncertain. It might easily happen that the kaolin distributed in beds, or irregularly in hollows, first attracted attention; this kaolin being mingled with quartz in such proportions that if pounded the whole would constitute a material well fitted for the manufacture of porcelain. Be this as it may, it is certain that porcelain was manufactured in China at a very early date. According to the researches of M. Stanislas Julien,\* the manufacture was commenced in the country of Sin-p'ing (province of Ho-nan) under the dynasty of Han, at some time between B.C. 185 and A.D. 87. Dr. Hirth, however, believes that the use of kaolin was not introduced until some time after A.D. 536, and probably during the T'ang dynasty; † while M. du Sartel also refers the origin of porcelain to this dynasty ‡ (618 to 906). According to Mr. Hippisley, "no specimens manufactured prior to the advent of the Sung dynasty have survived to the present day": § this dynasty extended from 960 to 1259. Mr. Franks remarks that "it was under the great native dynasty of the Mings (1368 to 1644) that the manufacture of porcelain received its greatest development." ||

It is probable that the general composition of the artificially prepared clays employed by the Chinese for their porcelain has long remained the same, so that by an examination of those now employed we may obtain a fair knowledge of those formerly used. According to the Père d'Entrecolles, who resided in the early part of the last century at King-te-chin, the site of the great porcelain manufactories, the chief ingredients are *kao-lin* and *pe-tun-tse*. It is generally believed that kaolin is the decomposed felspar above mentioned, but the definition of *pe-tun-tse* is involved in more difficulty. *Pe-tun* signifies a *white* paste, and the suffix *tse* is merely a diminutive applied to the material when made into the usual form of small cakes or bricks. It appears, indeed, that several substances used in the manufacture of porcelain, prepared in the form of white tablets, pass under the common name of *pe-tun-tse*; but by D'Entrecolles the name was restricted to the fusible ingredient of the paste, and therefore has generally been considered to denote a substance resembling our Cornish *china-stone*.

Certain rocks employed in the manufacture of Chinese porcelain, and collected at King-te-chin by the French Consuls at

\* "Histoire et Fabrication de la Porcelaine Chinoise; Ouvrage traduit du Chinois," par M. Stanislas Julien. Paris, 1856. Translator's preface, p. xx.

† "Chinese Porcelain: a study in Chinese Mediæval Industry and Trade." By F. Hirth. Shanghai, 1888.

‡ "La Porcelaine de Chine," par O. Du Sartel. Paris, 1881.

§ "Sketch of the History of the Ceramic Art in China." By Alfred E. Hippisley. Rep. *Smithsonian Inst.*, Washington, 1890, p. 387. See also Dr. S. W. Bushell's essay on "Chinese Porcelain before the present Dynasty," in *Journ. Peking Oriental Soc.*

|| "Catalogue of a Collection of Oriental Porcelain and Pottery." By A. W. Franks, Esq., F.R.S., F.S.A. 2nd edition, 1878, p. xiii.

Canton, have been the subject of recent study by M. Georges Vogt, of Paris. His researches, unlike those of Ébelman and Salvétat, lead to the conclusion that considerable differences exist between some of the materials used in China and those employed in Europe. Muscovite, a potash-mica, was invariably detected by M. Vogt, and he believes that the paste of Chinese porcelain contains in many cases nearly 20 per cent. of this white mica.\*

Some of the Chinese clays are prepared merely by washing, but those materials which are derived from hard rocks require to be reduced to powder and then mixed with water, when the finer particles are carried off in mechanical suspension, and gradually deposited in tanks. Steatite or soap stone (*hua she*, "slippery stone") is also sometimes used by the Chinese in their porcelain.

The following analyses (Nos. I and II.) by MM. Laurent and Malaguti, show the chemical composition of certain of the Chinese porcelains; the constitution of Chinese, like that of other porcelain, necessarily varying according to the intentions of the manufacturers as to the market for their wares. No. I. is an analysis of the paste or body of a white vase ornamented with painting, while No. II. is the analysis of the body of a greenish white plate with blue ornaments. For comparison with these are given two analyses (Nos. III. and IV.) of ancient Chinese porcelain by Professor A. H. Church, F.R.S. No. III. represents the composition of a white, and No. IV. that of a brownish, body.†

	I.	II.	III.	IV.
Silica - - -	70·5	63·5	75·0	72·0
Alumina - - -	20·7	28·5	17·8	17·5
Potash - - -	6·0	5·0	4·5	5·0
Soda - - -	—	—	1·0	1·0
Lime - - -	0·5	0·6	1·0	1·5
Protoxide of iron - -	0·8	0·8	0·2	2·5
Magnesia - -	0·1	trace	—	—
	98·6	98·4	99·5	99·5

With these analyses of Chinese porcelain it may be interesting to compare the composition of Japanese porcelain. M. Henry Würtz found the composition of a specimen of Japanese egg-shell china to be—Silica, 78·8; alumina, 17·8; oxide of iron, 0·6;

\* After stating his results, he adds: "Il en résulte que la pâte à porcelaine chinoise arrive à renfermer souvent près de 20 pour 100 de mica blanc, portion assez importante pour avoir une influence profonde sur les propriétés de la porcelaine ainsi composée."—"De la composition des roches employées dans la fabrication de la porcelaine en Chine." Note de M. Georges Vogt. *Comptes Rendus de l'Acad. des Sciences*, t. cx., 1890, p. 43.

† "Some Points of Contact between the Scientific and Artistic Aspects of Pottery and Porcelain." Cantor Lectures, by Prof. A. H. Church, M.A. *Journ. Soc. Arts*, vol. xxix., 1881, p. 141.

lime, 0·2 : potash, 0·2 : soda, 2·0. Professor Church has called attention to the preponderance of potash over soda in Chinese porcelain, and of soda over potash in Japanese porcelain. Possibly an explanation may be found in M. Vogt's recognition of a large proportion of potash-mica in the materials of many Chinese pastes. Numerous analyses of Japanese clays have been made, especially by Professor R. W. Atkinson, of Cardiff, who resided for many years at Tokyo.

*Introduction of Oriental Porcelain into Europe.*—Although vases and other pieces of Chinese porcelain found their way to Europe before the Portuguese had doubled the Cape of Good Hope in 1497, it was only after that event that this porcelain became well known to various European nations.\* The Portuguese appear to have carried on a considerable trade in Chinese porcelain, as also did the Dutch, who succeeded them in a great part of their East Indian traffic. According to Marryat,† the earliest mention of China ware in England is in 1506.

The English East India Company, formed in 1600, having at length obtained an establishment at the Port of Gombroon, opposite Ormus, in the Persian Gulf, imported porcelain directly from this port into England. The curious bowls and other objects in porcelain, ornamented with perforated designs filled in with a translucent glaze, are still known as *Gombroon ware*.‡

*First European Manufactory of Hard Porcelain at Meissen in Saxony.*—The introduction of Chinese porcelain produced a strong desire to imitate it; but, although the ornamental designs were copied upon ordinary European wares, such as those of Delft, it was long before any real advance was made towards the production of a similar paste. Italy appears to have been the land in which fair imitations were first produced, and it is said that at Venice a kind of porcelain was made, even in the fifteenth century. Although no specimens of Venetian porcelain of this early period are extant, it is otherwise with the Florentine ware, which dates back to 1575, of which several examples

---

\* The Portuguese introduced Chinese porcelain into Europe about 1520; but as early as 1487 some porcelain vases were sent from Egypt as a present to Lorenzo de' Medici.

† "A History of Pottery and Porcelain, mediæval and modern." 3rd ed., London, 1868, p. 247. Rapin states that "in the year 1506, Philip of Austria and Joan, who had taken the title of King and Queen of Castile, left the Low Countries, and embarked at Middelburgh for Spain. They set sail on the 10th of January, and before they left the Channel their fleet was dispersed by a storm, and the ship on board which they were ran into Weymouth. Sir Thomas Trenchard, the High Sheriff, went to pay his respects to them, and they accepted his invitation to lodge at his house at Wolveton." Hutchins, in his *History of Dorset*, states that "when the King took his leave, he presented his host with some immense Delft ware dishes, and some bowls of *Oriental China*." Mr. Marryat says that "these are the earliest pieces of Oriental porcelain known to us as having been brought to England, with the exception of a curious basin or drinking-bowl of the pale sea-green thick ware, called Archbishop Warham's (1504-1532)." Among the new year's gifts to Queen Elizabeth, 1587-8, Lord Treasurer Burghley offered one "porrynger" of "white porselyn" garnished with gold, and Mr. Robert Cecil, "a cup of grene porselyne."

‡ Some excellent examples of this ware, obtained in Persia by Gen. Sir R. Murdoch Smith, are exhibited in the South Kensington Museum.

are known to collectors. These early efforts at porcelain manufacture in Europe, however creditable, failed to produce a body like that of the hard Oriental ware, and no manufacture of porcelain acquired importance until the discoveries of Böttcher, in the early part of the eighteenth century, laid the foundation of the famous factory of Dresden china. Böttcher appears to have been an apothecary's assistant in Berlin, who fled into Saxony to avoid persecution on account of his supposed secret of making gold. It is related that when working in the laboratory of Tschirnhaus, an alchemist, at Dresden, some crucibles prepared by him assumed the character of Chinese porcelain. He at first worked at Dresden with a brown clay found near Meissen, and produced a red ware,\* but it was not until 1709 that he made white porcelain. Though not of good quality, it was sufficiently successful to lead to the establishment of a manufactory at Meissen by Augustus II., Elector of Saxony and King of Poland, who had previously seen the importance of the subject, and had even confined Böttcher, though with every comfort, in the Albrechtsburg at Meissen, in order to prevent his escape, and the consequent loss of the secret. In 1710, Böttcher was appointed director of the Meissen factory, and five years later he succeeded in making excellent porcelain. This manufactory has continued in existence to the present day, producing the fine porcelain known as Dresden china.

Whatever were the clays with which Böttcher originally worked, it appears that he finally employed the kaolin of Aue, near Schneeberg, in the Erzgebirge. It is stated that he was led to its use by finding that some hair-powder furnished to him was heavier than the ordinary kind; and by experiment he then ascertained that this powder, substituted for the wheaten flour with which the true hair powder should have been composed, was the substance which he sought for the manufacture of his porcelain, being, in fact, dried and powdered kaolin.†

The greatest secrecy was adopted with respect to Böttcher's method of manufacture. The kaolin itself was sent in sealed barrels, by sworn persons, and its exportation was prohibited. The workmen were closely watched, and the establishment at the Albrechtsburg at Meissen was a complete fortress for the confinement of the parties employed. The injunction "Be secret until death" was written in the workshops. This secrecy continued even down to 1812, when on M. Brongniart's inspection of the works at the requisition of Napoleon I., it was found

\* A double-handled cup and saucer, in Böttcher's red ware, will be found among the small collection of foreign specimens in the gallery on the western side. This piece may be assigned to about the year 1706.

† The statement is that John Schnorr, an iron-master, riding near Aue, observed that a soft white earth adhered strongly to his horse's feet. Considering that this earth might be used as a substitute for wheat-flour as hair-powder, he carried some away with him, and it was subsequently sold in large quantities for this purpose at Dresden, Leipsic, and other places. This kaolin continued long to be known as *Schnorr'sche weisse Erde* (Schnorr's white earth).

necessary to release M. Steinau, the director of the factory, from his oath, in order to explain the process adopted.

*Origin of other Continental Porcelain Works.*—Notwithstanding all the precautions taken, it happened in 1718, the year previous to Böttcher's death, that Stölzel, the chief workman at Meissen, escaped, and endeavoured to establish works at Vienna, with the aid and under the direction of a Belgian named Claude du Pasquier or Du Paquier. The latter obtained a license for 25 years from the Emperor Charles VI., but was not able to raise the funds necessary for carrying on the work in a proper manner. There was consequently no advance until the manufactory was acquired for the State by the Empress Maria Theresa in 1744. A workman from the Vienna manufactory named Ringler, made, in 1740, good porcelain at the pottery at Höchst, a village on the Nidda, in the territory of Mayence.

The method of manufacturing the Meissen porcelain gradually spread. In 1750, a porcelain manufactory was commenced at Berlin by a merchant named Wegely, who obtained the secret from the Höchst workmen. Gottskowki, a banker, succeeded in 1761, and advanced the works. Frederic II. bought them in 1763, and converted them into a Royal manufactory.

In 1758, a manufactory which had been established at Neu-deck, in Bavaria, in 1747, was transferred to Nymphenburg, near Munich. The St. Petersburg manufactory was founded by the Baron Yvan Antinovitch in 1744 and enlarged in 1765 by the Minister Olsonieff.

While the manufacture of hard paste porcelain was spreading in certain localities, that of a soft paste was also extending in other parts of Europe. In Italy it was established at Doccia in 1735, and at Capo di Monte, near Naples, in the following year. From Doccia the art was carried to Spain, and works were established at Buen Retiro in 1759. But by far the most important works were those in France.

The celebrated Sèvres works were first established at St. Cloud, where, from 1695, a ware with a coarse yellow paste had been manufactured. From the account given by Dr. Martin Lister, who visited the St. Cloud works in 1698, it would appear that "there was no moulding or model of China ware which they had not imitated; and they had added many fancies of their own, which had their good effects, and appeared very beautiful." Réaumur, who had obtained kaolin and pe-tun-tse from China, endeavoured to discover similar substances in France (1727 to 1729). Although he did not himself succeed in these researches, he nevertheless paved the way for the use of those substances at Sèvres when discovered. In 1745, a company was formed with privileges for 30 years, and the manufactory was established in the Château de Vincennes. These privileges were sold in 1753, and a third share having been taken by Louis XV., it obtained the title of a Royal manufactory. In 1756, the works were removed to Sèvres, more space being



required in consequence of their progress; and in 1760, Louis XV. became the sole proprietor. Though the "soft porcelain"\* had been made, as in England, for several years, the "hard porcelain," such as had been for a long time manufactured at Meissen, was not made at Sèvres until after the discovery of kaolin in France. This seems to have been first effected near Alençon, by the Comte de Brancas-Lauraguais, about the year 1758. Guettard gave an account of this kaolin to the *Académie des Sciences* in 1765. The clay, however, was found not sufficiently good for the purposes required, but soon afterwards kaolin was accidentally discovered at St. Yrieix, near Limoges, and having been ascertained to be both abundant and of good quality, the manufacture of hard porcelain was established at Sèvres in 1769.

*Early English Porcelain Works.*—With regard to our own country, it appears that evidence may be adduced tending to show that the manufacture of porcelain was attempted here at an earlier date than has been usually assigned to its introduction. As far back as 1671, Mr. John Dwight established at Fulham a manufactory for the production of various wares, including what has been termed porcelain. That the substance which he produced was strictly entitled to be called "porcelain" seems, however, to be open to much doubt, and the finest specimens of his production which have come down to us, though of great merit, may be described as a very fine variety of stoneware, approaching in some cases to translucency. Nevertheless, it is possible that Dwight succeeded in producing an imperfect kind of porcelain, of which no samples are now known. His patent of April 23, 1671, refers to "the mystery of transparent earthenware, commonly known by the name of porcelaine or China and Persian ware"; and Dr. Plot, in his *History of Oxfordshire*, published in 1677, mentions that Mr. Dwight "hath found ways to make an earth white and transparent as porcellane, and not distinguishable from it by the eye or by experiments that have been purposely made to try wherein they disagree." In support of Dwight's claims as the inventor of porcelain in this country, the late Mr Chaffers published† some extracts from certain memorandum books in the possession of Mr. C. J. C. Bailey, of Fulham, in which reference is made to receipts for the manufacture of different kinds of "transparent porcelane or china cley." It seems certain, however, that true china-clay, or kaolin, was unknown at the Fulham factory.

\* The term "soft" and "hard" porcelain are often employed to distinguish the different kinds, but it may be doubted how far this is advisable, seeing that the different kinds pass so much from one into the other. "Hard" porcelain is more refractory than "soft," and is usually also less easily scratched. Not only as respects the body or paste, but also with regard to the glazes employed, the same distinctions prevail; the harder bodies being commonly covered with harder glazes. The character of the fractured surface and the microscopic structure displayed in thin sections will serve in many cases to distinguish a "hard" from a "soft" paste.

† "Marks and Monograms on Pottery and Porcelain." 4th ed., 1874, p. 869.

The exact date of the foundation of the porcelain manufactories at Bow and Chelsea is not definitely known.\* From a patent† taken out in 1744 by Messrs. Heylyn and Frye, who were interested in the Bow manufacture, we learn that in their process a glass is formed with one part of either "pott ash, fern ash, pearl ash, kelp, or any other vegetable lixiviall salt," and "one part of sands, flints, pebbles, or any other stones of the vitrifying kind;" this frit being reduced to powder is mixed with variable proportions of *unaker*, from which sand and mica have been removed by washing. The "unaker" here mentioned was a china-clay which had then recently been brought from "the Cherokee nation in America," but its use does not appear to have been long continued, for in another patent taken out in 1749 by Thomas Frye alone, no mention is made of the use of unaker. In this specification he says: "As there is nothing in nature but by calcination, grinding and washing will produce a fixed indissoluble matter, distinguished by the name of virgin earth, the properties of which is (*sic*) strictly the same whether produced from animals, vegetables, or fossills, no other difference arising from the process but that some bodys produce it in greater quantities than others, as all animal substances, all fossills of the calcarious kind, such as chalk, limestone, &c.; take, therefore, any of these classes, calcine it till it smokes no more, which is an indication that all the volatile sulphurous parts are dissipated, and that the saline are sett loose; then grind and wash in many waters to discharge the salts and filth, reiterate the process twice more, when the ashes or virgin earth will be fit for use."‡ He then states that the ashes are to be mixed with flint or sand, and burnt; and the product, when ground, to be mixed with one-third of its weight of pipe-clay. Professor Church infers that the "ashes or virgin earth" of Frye's patent must have been bone-earth, or calcined bones, and substantiates his inference by an analysis of old Bow porcelain, which gave 17·3 per cent. of phosphoric acid, evidently due to the phosphate of lime in the burnt bone.§

With regard to the Chelsea works, Mr. Grosley, who visited London in 1765, was informed "that the county of Cornwall supplied them with the sort of earth fit to make porcelain."|| The sand used to render the clays perfectly "dry" is said to have been obtained from Alum Bay in the Isle of Wight, a sand which has been extensively employed in the manufacture of

---

\* Mr. Marryat points out that Dr. Martin Lister in 1698 alludes to a manufacture of porcelain (if such it could be termed, being little better than a kind of opaque glass) at Chelsea.

† Specifications of Patents, No. 610, Dec. 6, 1744.

‡ Specification of Patents, No. 649, March 17, 1749.

§ Cantor Lectures, *Journ. Soc. Arts*, vol. xxix., 1881, p. 128.

|| "Tour to London," Lond., 1772, vol. ii. p. 76.

glass.\* It is certain also that at the Chelsea works pounded glass was at first mixed with the clay and sand in order to imitate the transparency of the Chinese porcelain. A phosphatic paste was also made at Chelsea, Professor Church having found in one specimen 14 per cent. of phosphoric acid, thus proving that calcined bones were used as at Bow.

It should be noted that the early English porcelain produced at Bow, Chelsea, Derby, and Worcester was of the soft kind, and therefore very different from true Oriental porcelain.

It has been assumed, on evidence, however, which appears to be rather slender, that veritable hard-paste porcelain was made in England, of English china-clay, as early as 1766 by a remarkable Frenchman, the Comte de Brancas-Lauraguais.† From the *Scots' Magazine* for 1764 the following passage has been cited: "They write from Paris that after a number of " chymical operations, the Count de Lauraguais has at last " found out the true composition of the porcelain from China " and Japan, which he can manufacture at a very cheap rate, " as the materials are easily to be obtained." Shortly afterwards the Count settled in England, and sought to develop his manufactures here. In 1766 a patent was granted to "the " Count de Lauraguais, of London," who, "by labour, study, " travelling, and expence in trying experiments," had invented " A new method of making Porcelain Ware in all its different " Branches, vizt., to make the courser (*sic*) species of China, the " more beautiful ones of the Indies, and the finest of Japan"; and the patent adds that this is done "in a manner different " from any that is made in our dominions, and he having found " the materials tryed in Great Britain, has brought the same " to so great perfection that the porcelain made therewith after " his new method far excells any that has hitherto been made " in Great Britain, the same not being fusible by fire as all other " china made there is."‡ A distinction is here clearly drawn between the refractory ware made by the Count and the fusible soft paste produced at that time at several English works; while the statement seems equally clear that the materials used in the manufacture of the new porcelain were discovered in Britain. Professor Church found a fragment of this porcelain to contain—silica, 58; alumina, 36; oxide of iron, 1; lime, 1; potash, 3; and soda, 1 per cent.; and he adds: "the kaolinic " character of this ware is evident."§ Very little, if anything,

\* This sand occurs at the base of the Lower Hendon Beds, forming part of the Tertiary strata on the northern side of the Isle of Wight. The pure white sand was at one time worked and carried away in large quantities from Hendon Hill, Alum Bay, for glass manufactories.

† "Marks and Monograms on Pottery and Porcelain." By William Chaffers. 4th ed., 1874, p. 533.

‡ Specifications of Patents, No. 849, June 10, 1766.

§ Cantor Lectures, *Journ. Soc. Arts*, vol. xxix., 1881, p. 142.

seems, however, to have been done in manufacturing a hard paste in England previously to Cookworthy's famous discovery.

*Cookworthy's discovery of kaolin.*—The great advance of the porcelain manufacture in England is due to the discovery of the kaolin of Cornwall by William Cookworthy of Plymouth. According to Mr. Worth, this discovery must have been made between the years 1745 and 1750,\* and therefore long before the date of any reference to the discoveries of the Count de Lauraguais. Cookworthy apparently had his attention directed to the subject by an American, who showed him samples of China-stone and kaolin from Virginia in 1745 † He afterwards found these substances in Cornwall, and eventually worked both, in conjunction with Lord Camelford, on property of the latter in the parish of St. Stephen's. Borlase in his *Natural History of Cornwall* (1758) makes no mention of any Cornish clays employed in pottery, but merely notices that of Amalebria in Towednack, as likely from some experiments he had made, to be useful for porcelain, stating that there were other white clays at Tregonning Hill near Breage. He also notices other clays as fitted for the purpose, and mentions that W. Cookworthy had made experiments on the Breage China-stone, and that it had been found useful in the manufacture of porcelain. Pryce in his *Mineralogia Cornubiensis*, published in 1778, states that artificial kaolin (China clay) was then prepared in the parishes of Breage and St. Stephen's by repeated washings with clear water, and afterwards packed in casks and sent off, ‡ and that Mr. Cookworthy, by his late improvements at his porcelain manufactory then established at Bristol (having been removed thither from Plymouth), was likely to produce ware which should rival the best Asiatic China. Mr. Worth considers it almost certain that Cookworthy's first experiments were made at Plymouth, but that "the first attempts to establish the " manufacture were made at Bristol." It was at Plymouth, however, that the hard paste was first made on a large scale. In 1768, Cookworthy took out his celebrated patent for using Cornish clay (kaolin) and moorstone (China-stone) in the manufacture of porcelain ;§ shortly afterwards he joined Richard Champion of Bristol, and in 1773 the patent right passed into Champion's name.|| The hard paste porcelain of Plymouth and Bristol will be described in detail in a subsequent chapter (see pp. 127, 131).

\* "William Cookworthy and the Plymouth China Factory." By R. N. Worth, F.G.S. *Trans. Devon Assoc.*, vol. viii., 1876, p. 480, |

† Prideaux's "Relics of William Cookworthy," 1853, p. 12.

‡ "Mineralogia Cornubiensis," p. 32.

§ Specifications of Patents, No. 898, March 17, 1768.

|| See Mr. Hugh Owen's "Two Centuries of Ceramic Art in Bristol," 1873.

## RAW MATERIALS

*Employed in the Manufacture of Pottery and Porcelain.*

[See specimens in lower compartments of Pedestal Cases.]

Soon after the Museum of Practical Geology was established, now more than 50 years ago, it was considered desirable to illustrate the application of clays and other mineral-substances to the manufacture of pottery and porcelain. Most of the specimens collected at that time are still preserved in the Museum, and will be found in the lower compartment of the pedestal case, numbered 53.

Rather more than 20 years ago this department received an important extension by the generosity of Mr. George Maw, F.G.S., of the Benthall Works, near Broseley, in Shropshire. Uniting the experience of a practical manufacturer with much geological knowledge, Mr. Maw had for many years collected various plastic materials from different parts of Britain; and had gone to the expense, whenever considered desirable, of having them chemically analysed: moreover, in all cases, he had examined carefully into the physical characters of the substances, with a view to their applicability to ceramic manufactures. Mr. Maw's collection—numbering upwards of 700 specimens, representing more than 120 different kinds of clay—is displayed in the lower compartments of the six pedestal cases in that part of the museum devoted to ceramic products.

The specimens are arranged in geological sequence, commencing with the newer deposits, viz. :—

Nos.	1 to 18.	Recent and Post-Tertiary.	
„	19 to 28.	Miocene.*	
„	29	Middle Bagshot.	} Eocene.
„	30 to 42.	Lower Bagshot.	
„	43 to 45.	London Clay.	
„	46 to 48.	Woolwich and Reading series.	
„	49 to 51.	Cretaceous.	
„	52 & 53.	Speeton Clay (Cretaceous and Jurassic).	
„	54 to 61.	Wealden.	
„	62 to 68.	Purbeck beds of Dorsetshire.	
„	69 to 79.	Jurassic and Rhaetic.	
„	80 to 84.	Triassic (Keuper).	
„	85 to 90.	Permian.	
„	91 to 115.	Carboniferous.	
„	116 to 118.	Devonian.	
„	119 to 123.	Silurian.	

\* Since Mr. Maw presented and arranged his collection Mr. J. Starkie Gardner has maintained that the Bovey Clays are not Miocene, as formerly held, but are probably of Lower Bagshot age.

Each clay is represented by six specimens, in the following order, namely:—

1. The native clay in the unburnt state.
2. The native clay in the kiln-burnt state.
3. A slab of unburnt clay, exactly 4 inches square, pressed out of refined clay after the coarse particles had been removed by passing it through a fine lawn of wove wire containing 100 wires of 10,000 perforations to the inch.
4. The coarse matter so removed.
5. A burnt slab of native or unrefined clay originally moulded 4 inches square.
6. A burnt slab of refined clay originally moulded 4 inches square.

The value of this collection is greatly increased by the fact that each specimen has been distinctly labelled by the donor, and that Mr. Maw also contributed, at the time of his donation, the following remarks on the general subject of clays and other plastic materials, in relation to their utilisation in ceramic manufactures:—

“Plastic strata may be defined as beds of mechanical origin, containing alumina as an essential constituent, which have undergone little or no consolidation, or been subject to metamorphic action.

“Although common to various geological formations from the paleozoic to the most recent deposits, a very large proportion of plastic strata applicable to ceramic manufactures occur in the recent and tertiary beds.

“Plastic strata diminish in frequency as the older deposits are approached: in the earlier paleozoic formations the beds which were at the time of deposition soft clays and marls occur for the most part as shales and slates, or have undergone further metamorphism into hard porcelanites and other altered rocks unavailable for the potters' use. Indeed the very changes which the potter effects by artificial heat have, as regards the earlier rocks, been anticipated in the laboratory of nature, pressure in combination with heat having altered their original soft and plastic condition, changing them into the hardest rocks.

“It must not, however, be supposed that all clays of economic applicability occur in a soft and plastic state, as every gradation exists between hard metamorphic rocks and the softest clays, and many of the most valuable clays occur in a semi-indurated condition, are mined by the process of blasting, and brought to the surface in hard rock-like masses. These, by exposure to atmospheric changes and alternations of wet and drought, frost and thaw, are speedily, by the process known as *weathering*, disintegrated and reduced to the plastic condition.

“*The state of mechanical sub-division* is of no little importance in the applicability of clays to the various purposes of ceramic manufacture. A reference to the specimens will at once show that every gradation exists between an almost impalpable con-

dition\* and a mixture of coarse and fine matter, as in the bulk of the specimens, the coarse residue of which sometimes forms as much as 10 or 20 per cent. of the entire weight.

"Bearing in mind that most clay-strata result from the mechanical disintegration of older rocks, it will be easily understood that their state of subdivision has been dependent for the most part on the transporting and sorting agencies of water, carrying away and separating the finer parts held longer in suspension than the coarse matter.

"The origin of some of the finer white clays must, however, be attributed to the chemical dissolution of calcareous rocks by the agency of carbonated water, the insoluble silica, alumina, magnesia, &c., associated with carbonate of lime in chalk and limestone in the finest state of sub-division, being left behind as an impalpable residuum. The writer, in a paper on 'The sources of the materials composing the white clays of the Lower Tertiaries,' published in the 'Quarterly Journal of the Geological Society' (vol. xxiii. p. 387), suggested such a derivation from the chalk, of the smooth clays of Bovey Tracey and Newton Abbot (Nos. 20-27), and of similar clays from the Lower Bagshot beds of Wareham (Nos. 30-38), and it seems scarcely open to question that the white clays resting on the carboniferous limestone of North Wales, Derbyshire, and Tipperary (Nos. 12-18) are the remnants of the subaerial dissolution of the limestone. (See papers on this subject by the writer at pp. 241 and 299, vol. iv., of *The Geological Magazine*.)

"The *chemical composition* of plastic strata varies as much as their mechanical condition. They may be generally described as an association of silicate of alumina, alumina, free silica, and magnesia, with more or less water of combination. Clays and marls scarcely ever occur entirely free from iron, to which their colour is mainly due; it exists in various states of combination further referred to below. Carbonaceous matter, especially in the tertiary and carboniferous clays, is frequently associated in a fine state of subdivision, and the alkalis are generally present in variable proportions both as silicates and carbonates.

"*Contraction in burning*.—This character is of so much importance in all branches of ceramic manufacture that it may be of interest to notice one or two features that the experiments exhibit.

"The amount of contraction in burning, due partly to the loss of water of combination and of the carbonic acid in the carbonates, when present, and to the ignition of any carbonaceous matter contained in the clays, but more especially to the drawing together of the particles in the production of vitreous silicates, is very variable and depends both on the chemical and mechanical

---

\* As in examples 20, 21, 22, 23, 24, and 27 from the Bovey Tracey lignite deposit from the Newton Abbot Clay Works, and Nos. 30, 31, 32, 33, 34, 35, 36, 37, and 38 from the Lower Bagshot beds of Wareham, and also Nos. 43 and 123, from which the finest lawn failed to separate any gritty particles.

composition of the clays. The presence of the alkalies and iron tends to complete vitrification, which is always accompanied by a great amount of contraction, and the production of a glass-like body with a bright conchoidal fracture (as in No. 115). On the other hand, in clays containing much free silica or even silicate of alumina without the accompaniment of the fluxing alkalies, a small amount of contraction takes place and an open porous 'body' is the result.

"The amount of contraction is not less due to the state of mechanical subdivision of the constituent particles. Clays in a coarse state of subdivision and containing a large proportion of gritty matter, especially silicious sand, invariably contract less in burning than those of smooth and fine texture, in which the constituents are in an impalpable state of subdivision; this will be at once seen by a comparison of the amount of contraction of the slabs composed of the coarse clay in its natural state with those moulded from the clays from which the coarse particles have been removed; and the larger the proportion of coarse matter in the native clay the greater is the difference between the amount of contraction of the clay in its natural and refined states. The average contraction of the whole of the burnt slabs composed of the native unrefined clay amounts to 6·01 per cent., and of the burnt slabs of refined clay 7·53 per cent. of the original moulded size. This appears due to two causes, firstly, that a mixture of large and small particles is, to begin with, actually more dense than a mass of particles of equal size, and therefore admits of less contraction in the drawing together of the particles in vitrification, and secondly, that the coarser subdivision and less intimate contact seems to hinder the recombination of the constituents as vitreous silicates in the process of burning.

"Few clays produce a perfectly vitreous and unabsorbent body. Some of the burnt slabs approach to a glassy texture; whilst others are so highly silicious and coarse in grain as to be held together by very slight cohesion. These are in the burnt state open and spongy, and have undergone but little contraction in the kiln. Such clays, as for example Nos. 108, 109, 110, 111, 112 from the North Worcestershire coalfield, of which the celebrated Stourbridge fire-bricks are made, are from their refractory character eminently suitable for the manufacture.

"The great majority of the examples are intermediate in character between these two extremes, and after the process of burning, form a compact but slightly porous body, subject to a moderate amount of contraction, and are available for general pottery purposes.

"*The Colouring Matter of Clays.*—No native clay is entirely free from the presence of iron which occurs in aluminous earths in various proportions and states of combination. Those most free from iron are the white Tertiary clays of Devon and Dorset, largely exported from Teignmouth and Poole for the



manufacture of white earthenware ; for this purpose the absence of iron is a matter of great importance, as it imparts to the ware a yellowish tint, to obviate which it is found necessary to cloak and neutralise the natural cream colour of the burnt clay by the admixture of very small proportions of cobalt blue.

"Iron in the white and gray Tertiary clays occurs principally in the form of gray carbonate of protoxide, generally in association with finely divided carbonaceous matter, in proportions varying from a mere trace up to 4 or 5 per cent.

"Iron, which is so prejudicial in clays employed for white pottery, is an essential colouring matter in those used in the manufacture of terra-cotta, encaustic tiles, bricks, and all common pottery.

"These may be considered separately as—

"(a.) Gray clays ; (b.) Yellow clays ; (c.) Red clays.

"(a.) *Gray Clays*, so largely developed as '*clunches*' and fire-clays in the carbonaceous beds of the coal measures, owe their colour, in addition to the presence of carbonaceous matter, to carbonate of protoxide of iron in a fine state of subdivision, and occasionally to the presence of finely divided pyrites or bisulphide of iron (as in Nos. 45, 65, 70, 72, and 103), which also occurs in the London clay, gault, &c.

"A pale gray clay, almost white (No. 61), from the base of the Ashdown Sands (Wealden), near Hastings, contains a much larger proportion of iron than its colour would seem to indicate, from its occurring in the form of the comparatively colourless basic sulphate, of which there is 1.68 per cent. present.

"(b.) *Yellow clays* are coloured by hydrous sesquioxide of iron, and generally occur as surface deposits, or where red and gray clays have been subject to weathering, as on exposed surfaces or along lines of jointing. They occasionally occur (*e.g.* No. 30) interstratified with red and gray beds, but appear more generally to be the result of a kind of rusting process. Gray carbonate of iron on exposure to watery infiltrations, accompanied by atmospheric oxidation, becomes converted into the yellow hydrous sesquioxide ; and bisulphide of iron, which readily decomposes under similar circumstances, becomes converted partly into sulphate of protoxide and partly into hydrous sesquioxide, to the presence of which the yellow joint surfaces of the London clay and gault are due.

"Yellow clays have also been derived from red beds by the red anhydrous sesquioxide and the lower hydrates receiving water of combination.

"(c.) *Red clays and marls*, *e.g.* those of the Keuper, Old Red beds, Permian, coal measures, the middle Wealden, the Neocomian strata of France, the plastic clay of the London and Paris basins, and other Tertiary strata, derive their colour from the presence of anhydrous sesquioxide and the

lower hydrous oxides of iron which occur in variable proportions, and are generally associated with small quantities of iron in other states of combination, the colour of which the red oxide obscures. Red hæmatite may be cited as a familiar example of almost pure anhydrous sesquioxide of iron, which, when finely divided, has a strong colouring power. The red keuper marls receive their colour from about 3 per cent. of this anhydrous sesquioxide, whilst the red clays of the *argile plastique* of Paris, and of the Neocomian beds of Beauvais, used in the manufacture of the celebrated Beauvais pottery, contain as much as 20 per cent., equivalent to 15 or 16 per cent. of metallic iron. Nearly all such red clays are variegated by lighter patches from which the oxide of iron has been abstracted; partly by a segregational process, drawing together the iron into ferruginous nodules of hydrous sesquioxide, and also from its dissolution by the acids of organic decomposition derived from imbedded organic remains. Details of the analysis of red and other clays will be found in a paper by the writer 'On the disposition of iron in variegated strata,' Quarterly Journal of the Geological Society, vol. xxix. p. 351.

"*The Colouring of Burnt Clays.*—The colour of burnt ferruginous clays is entirely due to the amount of iron present, irrespective of its previous state of combination, but subject to certain conditions in the general composition of the clay. The action of the kiln, with some exceptions referred to below, is uniform on nearly every state of combination in which the iron occurs; viz., to reduce it to anhydrous sesquioxide associated as silicates in a more or less intimate state of combination with the other silicates developed in the process of burning.

"Yellow clays coloured with hydrous sesquioxide (*e.g.* yellow ochre), as in No. 30, and red clays coloured with anhydrous sesquioxide, and the lower hydrates merely lose their water of combination and become bright brick reds (*e.g.* red ochre and venetian red).

"Gray clays containing finely divided pyrites or bisulphide of iron are also converted by the kiln into bright reds, the sulphur being driven off, leaving the terra-cotta charged with the red anhydrous sesquioxide.

"In clays charged with gray carbonates of iron the following reaction takes place: The carbonic acid ( $\text{CO}_2$ ) is driven off as carbonic oxide ( $\text{CO}$ ), part of its oxygen peroxidising the iron.

"Gray clays containing less than 1 or  $1\frac{1}{2}$  per cent. of iron change in the kiln to various shades of cream colour and buff, whilst those containing from 2 to 10 or 12 per cent. range in colour from yellowish-fawn to dark reds; from 3 to 4 per cent. of iron produces in the kiln the bright red bodies used in the manufacture of red terra-cotta, encaustic tiles, red building bricks, &c. There seems to be no essential difference (with the exception noticed below) in the colouring matter of the clays

that burn buff and those that burn red in the kiln, the depth of colour depending merely on the amount of iron present, the buff shades regularly graduating into the deeper shades of red.

“The brightest shades of red and buff are, however, produced with but a partial vitrification of the body. At a heat sufficient to insure its complete vitrification a further change of colour takes place. The bright buff shades are changed to neutral grays, and the reds to a slaty-grayish-black, which probably results from a partial reduction of the metallic colouring matter and its more intimate combination with the other vitreous silicates produced at the higher temperature. In clays containing a large proportion of carbonaceous matter the complete peroxidation and consequent colouring power of the iron seems to be arrested. In No. 28, containing 13 per cent. of organic matter, the combustion of the carbon in contact with the ferruginous oxides seems wholly or partially to have reduced them to a metallic state, or lower oxide having less colouring power than the sesquioxide, and a remarkable bleaching of the burnt clay has been the result. The presence of the alkaline earths in ferruginous clays, especially of lime and magnesia, has also a singular bleaching power in the kiln, arresting the development of the bright red colour. No. 90, a Permian marl containing 6 per cent. of sesquioxide of iron and 35 per cent. of carbonate of lime, burned of a grayish buff instead of the rich red such a proportion of iron would otherwise have produced. From some experiments made by the writer, it has been ascertained that as small a proportion as 5 per cent. of caustic magnesia mixed with a red clay, entirely destroys its red colour in the kiln, probably from the production of a pale-coloured double silicate of iron and the alkaline earth. A familiar example of this reaction occurs in the process of manufacturing yellow bricks in the neighbourhood of London, the colour of which is dependent on the admixture of ground chalk with the brick earth, the brick earth by itself burning of a red colour.”

Apart from Mr. Maw's large collection of specimens of plastic strata, there will be found, in the lower part of Pedestal Case 53, a small series illustrating the raw materials usually employed in ceramic manufactures, and including the china-clays and china-stones which form the basis of true porcelain.

*Kaolin or China Clay, &c.*—Kaolin, or China clay, is chiefly prepared in Cornwall from the decomposed granite in the neighbourhood of St. Austell and St. Stephens, and from the north side of Tregoning Hill near Breage; while in Devon it is worked at Lee Moor, near Plympton, and at Cornwood on the south side of Dartmoor. Although the method of preparing kaolin is sufficiently simple, much care is required to obtain the substance in as pure a condition as possible. The presence of iron has particularly to be avoided, as many of its compounds would tend

to colour the paste of the porcelain or the earthenware into the composition of which they might enter.

In preparing kaolin those localities are preferably selected where water can be readily procured, and where the rock is in a peculiarly soft and friable state owing to the decomposition of its felspar. The conditions under which this disintegration has probably been brought about have already been referred to at p. 5. The less of foreign minerals the rock may contain, and the harder, the heavier, and the less decomposed these may be, the better. The disintegrated rock, consisting of clay, usually associated with much quartz and mica, is broken up by the pick, and exposed to the action of running water. The water containing the clay in a state of mechanical suspension is led through a system of channels, called "drags," in which its velocity becomes checked and some of the associated quartz and mica is consequently deposited. Thence the clay-water is usually conducted through other channels, known as "micas," which serve as catch-pits for the deposition of such particles of mica as escaped from the previous treatment. Thus purified, the stream is diverted to a series of "pits" in which the suspended clay slowly settles down, and eventually the clear supernatant water is run off, to be used in some cases for the treatment of fresh clay-rock. The deposit of clay, still semi-fluid, is subsequently transferred to larger tanks of stone, where it remains until it acquires considerable consistency, and is finally conveyed to the "dry," or building in which the clay is spread over the tile flooring, or "pan," which is heated by furnace flues. According to Mr. Collins the clay, when first brought to the "dry," contains about 50 per cent. of water, and this is reduced to about 12 or 14 per cent. in the dry clay. From every ton of clay nearly 1,500 lbs. of water must consequently be evaporated, and this evaporation is effected in the best works by the expenditure of about 168 lbs. of coal.\*

Samples of kaolin, or china-clay, are exhibited from various localities near St. Austell in Cornwall, and from the Morley or Lee Moor Works in Devon.

The following analyses of kaolin from Bluebarrow, St. Austell, (A. 6), and from St. Stephens, Cornwall (A. 7), were made by Dr. Lyon Playfair (now Lord Playfair) at the laboratory of this Museum, in 1852:—†

\* "The Hensbarrow Granite District." By J. H. Collins, F.G.S. Truro, 1878, p. 22. See also *Journ. Soc. Arts*, vol. xxiv., 1876, p. 572.

† For other analyses of kaolin, see *Mineralog. Mag.*, vol. vii., 1887, p. 76, where Prof. W. Ivison Macadam gives 27 analyses. See also Mr. Collins's analyses in his paper "On the Nature and Origin of Clays" in *Min. Mag.*, vol. vii., 1887, p. 205.

The results of modern investigations on clays in Germany (especially by Aron, Bischof, Richters, and Seger) are well summarised in Dr. Zwick's *Jahrbuch über die Leistungen und Fortschritte der Thonwaren-, Kalk-, und Cement-Industrie*. 1. Jahrgang. Berlin, 1878.

*Clays dried at the Temperature of 212° Fahrenheit.*

	Bluebarrow.	St. Stephens.
Silica - - - - -	45.52	46.38
Alumina, with peroxide of iron - - - - -	40.76	38.60
Lime - - - - -	2.17	3.47
Potash, with trace of soda - - - - -	1.90	1.77
Magnesia, phosphoric acid, and sulphuric acid -	traces	traces
Water, with a small quantity of organic matter -	9.61	9.08
	<hr/> 99.96	<hr/> 99.30

The specimen A. 15 is a sample of *Bovey clay*, an impure kind of china-clay naturally prepared by the action of streams on the disintegrated granite of Dartmoor, as explained on p. 6. This clay is largely worked near Newton Abbot, but is known commercially from the place of shipment as *Teignmouth clay*.

The following is an analysis of *Teignmouth clay* made in the laboratory of this institution by Mr. W. Weston :—\*

Silica - - - - -	52.06
Alumina - - - - -	29.38
Potash - - - - -	2.29
Lime - - - - -	0.43
Magnesia - - - - -	0.02
Protoxide of iron - - - - -	2.37
Water { combined - - - - -	10.27
{ hygroscopic - - - - -	2.56
	<hr/> 99.38

In the year 1892 there were produced in Devonshire 32,688 tons of clay, principally from Bovey Tracey, Newton Abbot, and Kingsteington.†

Several specimens, marked A. 16 to 20, presented by Messrs. W. and J. Pike, of Wareham, illustrate the different kinds of *Poole clay*, already noticed at p. 6. The amount of clay sent from Poole by sea and rail in 1892 was 80,103 tons.‡ The clay is dug between Wareham and Corfe, and at several other localities in the Lower Bagshot beds of Dorsetshire.

The following is an analysis of *Poole clay* made in the laboratory of this institution by Mr. W. Weston :—§

Silica - - - - -	48.99
Alumina - - - - -	32.11
Potash - - - - -	3.31
Lime - - - - -	0.43
Magnesia - - - - -	0.22
Protoxide of iron - - - - -	2.34
Water { combined - - - - -	9.63
{ hygroscopic - - - - -	2.33
	<hr/> 99.36

\* Dr. Percy's "Metallurgy," vol. i., 1875, p. 99, where will be found a large number of analyses of clays.

† "Mineral Statistics of the United Kingdom . . . for the Year 1892. Prepared by H.M. Inspectors of Mines, by direction of the Secretary of State for the Home Department," 1893, p. 16.

‡ *Ibid.*, p. 19.

§ Percy's "Metallurgy," vol. i., 1875, p. 99.

The specimen A 21 represents the famous *Stourbridge clay*, a highly refractory "fire-clay," from the coal measures of Stourbridge, Worcestershire: used for fire-bricks, crucibles, saggars, &c.

The following analysis of Stourbridge clay was made by Mr. C. Tookey in the laboratory of this institution, under the direction of the late Dr. Percy:—\*

Silica	-	-	-	-	-	-	-	-	65·10
Alumina	-	-	-	-	-	-	-	-	22·22
Potash	-	-	-	-	-	-	-	-	0·18
Lime	-	-	-	-	-	-	-	-	0·14
Magnesia	-	-	-	-	-	-	-	-	0·18
Protoxide of iron	-	-	-	-	-	-	-	-	1·92
Phosphoric acid	-	-	-	-	-	-	-	-	0·06
Water { combined	-	-	-	-	-	-	-	-	7·10
{ hygroscopic	-	-	-	-	-	-	-	-	2·18
Organic Matter	-	-	-	-	-	-	-	-	0·58
									<hr/>
									99·66
									<hr/>

A large collection of fire-clay bricks, crucibles, retorts, and other ware for withstanding high temperatures, will be found in a table case on the western side of the Hall, near to the series of British building stones.

### *China Stone.*

The china-stone of Cornwall, which is largely exported to the Potteries, is a disintegrated granite rock, consisting usually of a mixture of quartz, partially decomposed felspar, and scales of a greenish-yellow micaceous mineral called gilbertite. The extent to which the felspathic constituent has suffered alteration varies materially in different varieties of china-stone, but the felspar always retains more or less of its alkaline silicate, which thus renders the rock fusible. It is often associated with fluor-spar, which materially increases its fusibility.

It is generally assumed that china-stone represents the disintegrated granitic rock which, in a more advanced state of decomposition, furnishes kaolin; but the relation between the china-stone and china-clay is still somewhat obscure. The stone seems in many cases to occur as patches and bands in the granite. The china-stone is quarried chiefly from the granite of St. Stephens, in Cornwall, which furnishes also some of the best kaolin. In quarrying the stone, those parts should be avoided in which it becomes intermixed with schorl, or black tourmaline, a mineral somewhat common in the granite of which the china-stone forms a portion. The stone requires no preparation before being sent to the potteries, but when quarried is merely broken into pieces of a size convenient for carriage.

---

\* Percy's "Metallurgy" vol. i., 1875, p. 98. For other analyses of fire-clays, &c., see "Catalogue of the Collection of Metallurgical Specimens formed by the late John Percy, Esq., M.D., F.R.S., now in the South Kensington Museum. By Prof. J. F. Blake, M.A., F.G.S. With an Introduction by Prof. Roberts-Austen, C.B., F.R.S." 1892.

Some of the china stone is so compact as to be used locally as a building stone, and it has the reputation of being durable. Mr J. H. Collins proposes to distinguish the china-stone as a definite rock under the name of *Petuntzite*, and gives the following analyses of this rock from St. Stephen's by Mr. J. B. Hannay, of Glasgow:—\*

	I.	II.	III.
Silica - - - - -	73·39	69·50	71·66
Alumina - - - - -	16·50	17·85	18·79
Lime - - - - -	0·50	2·66	1·70
Magnesia - - - - -	0·31	0·12	0·35
Potash (with a little soda) - -	7·66	7·98	6·60
Iron - - - - -	trace	trace	trace
Manganese - - - - -	—	trace	trace
Fluorine - - - - -	·74	·71	·14
Water - - - - -	1·25	1·30	0·91
	100·35	100·12	100·15

The specimens A. 22 to 25 are samples of china-stone from St. Stephens, St. Dennis, and Tregonning or Tregonau Hill, near Breage, all presented by the late Mr. J. Arthur Phillips.

According to the "*Mineral Statistics for 1892*," the amount of china-clay and china-stone conveyed from Cornwall by rail and sea during the year was 408,492 tons, having the value at the openworks of 306,369*l*. It is assumed that the amount thus sent away represents the total production of the county for the year.

### Flint.

Although natural clays, such as the Bovey and Poole clays previously mentioned, are extensively employed in the manufacture of British pottery, they are usually mixed, to a greater or less extent, with the artificially prepared kaolin of Cornwall and Devon, the proportions varying according to the kind of earthenware or porcelain required. Grains of silica are always mechanically mingled with the clays, and these are now commonly derived from finely-pounded flints. The flints† are

\* "The Hensbarrow Granite District." By J. H. Collins, F.G.S., 1878, p. 32. Mr. Collins distinguishes the china-clay rock as *Carclazite*, taking the name from the famous works of Carclaze, near St. Anstell, in Cornwall.

† The introduction of flints into the manufacture of pottery is attributed to Mr. Astbury, a Staffordshire potter of great enterprise, who, in 1720, riding to London on business, as was then a common practice, found his horse's eyes disordered before he reached Dunstable. On arriving at the inn in that town he consulted the ostler, who placed a small flint in the fire, heated it to redness, and, after throwing it into water, pulverised it. He then blew a little of the powder into the horse's eyes. The attention of Mr. Astbury was arrested by the process of reducing the flint to powder, and observing the white character of the latter, he had some flints sent to Shelton, "where," according to Dr. Shaw (*Chemistry of Porcelain, Glass, and Pottery*, 1837, p. 248), "on his return home he had them fired after the ware was baked; then pulverised in a large mortar, and in the state of powder mixed with pipe-clay in water, with which he washed the inside of his hollow ware. Ultimately it was introduced into the body."

obtained from the chalk districts from which there is the cheapest carriage. Those which are black are usually employed; and rolled flint pebbles, or boulder flints, from the sea-shore, are much preferred to flints quarried directly from the chalk.

The flints are first calcined or burnt in a kiln to render them easily broken, and they are then stamped or crushed and, being afterwards mixed with water, are reduced to the consistency of cream by grinding in circular pans, the bottoms of which are commonly paved with some hard stone, generally chert, over which heavy stones of the like kind are driven round by machinery, and the flints are thus ground in water between them. When taken out of these pans the mixture is placed in a reservoir, often termed an *ark*, where the pounded flint settles and the water is drawn off.

The specimens A. 26 to 29 show the flints in the raw state; calcined; stamped and crushed; and, finally, ground in the mill. A. 30 is a sample of *chert* from the Carboniferous Limestone of Gronant, Talacre, Flintshire; used for paving the flint-grinding mills in the Staffordshire potteries.

#### MANUFACTURE OF EARTHENWARE AND PORCELAIN.

[See specimens in lower compartment of Pedestal Case No. 53.]

##### *Manufacture of Earthenware.*

With respect to the manufacture of common earthenware, one which is carried on in England on a vast scale, not only for home consumption, but also for exportation, the following sketch of the processes usually employed may be useful to the visitor.\*

The *common body* is generally composed of Dorset or Poole clay ("ball clay"), Cornish or Devon kaolin, and flint.

The *best body* is formed of Dorset or Poole clay, Cornish or Devon kaolin, Cornish china-stone, and flint.

The Dorset or Poole clay, which may be regarded as the base or chief ingredient in the manufacture of English earthenware, is beaten up with water, and reduced to a state in which it can be passed through sieves of various sizes, in order to free it from lumps, and to render it of a fine uniform consistency. The kaolin requires no preparatory cleaning, and the flints are used in the finely-comminuted form in which they are obtained by their deposit in water after passing through the grinding mills. The china-stone requires to be crushed and reduced to a fine powder in mills, its treatment being indeed similar to that of the flints, with the exception of its not requiring calcination.

All the materials being thus ready for use, the proportions of each considered requisite for the kind of ware about to be made are mixed with water and with each other, and the mixture taken to the *slip kiln*, a long brick trough heated by means of

---

\* An excellent description of the manufacture will be found in an article by Mr. W. Burton in Prof. Thorpe's "Dictionary of Applied Chemistry," vol. iii., 1893, p. 296. For porcelain, see also M. Dubreuil's volume, "La Porcelaine," in Fremy's *Encyc. Chim.*, Paris, 1885.



flues from a furnace. Here it is kept simmering until it acquires somewhat the consistency of dough. In this state it is ready for use, and is placed, until required, in cold dark cellars. If coloured bodies or pastes are required, so as to give a general tint to the ware, certain metallic oxides, or coloured clays or marls, are added to the prepared mixture. The specimen B. 1 shows the paste ready for use.

The body or paste of mixed materials being now prepared, it is either *thrown*, as it is termed, by means of the potter's wheel (see p. 35), that is, raised into circular forms of different kinds by means of the rotary motion of the wheel, and by the action of the fingers; or more generally it is *moulded* into forms: in the latter case the paste is first rolled into flattened pieces, which can be easily squeezed into a mould, commonly of plaster of Paris. The "thrown" forms may be finished by placing them on a lathe and turning them into more accurate shapes. B. 2 is a piece of ware thrown on the wheel, and B. 3 a similar piece after turning on the lathe.

The various forms having been completed, the pieces are carefully dried in rooms prepared for the purpose, in order to deprive them as much as possible of moisture. Indeed, the water is to be regarded only as a tool in the manufacture, a vehicle of plasticity to be laid aside when no longer required.

Having been thus sufficiently dried, the pieces of earthenware are placed in large flat-bottomed pans, oval or round, as may be considered desirable, with vertical sides of sufficient height; these cases are termed *saggers* or *seggars*, and are made of refractory materials, such as fire-clays, broken pieces of earthenware after the first firing, and also of broken saggers themselves, pounded up, and often mixed with a small portion of damaged Dorset, Devon, or Cornish clays. In these saggers the dried pieces are so placed as to allow as many as possible to be packed without injury to one another. The objects are generally supported on a bed of finely ground calcined flint. The saggers are then arranged in a conical kiln, termed the "biscuit kiln," in piles one above another, so that an upper covers a lower sagger. Common ware is sometimes burnt without protection in saggers. The kiln is then *fired*, that is, the proper heat is communicated to it, and the fire is continued for about three days; for instance, a kiln fired on Monday evening will be ready to be *drawn*, or the saggers and their contents removed, on Friday morning. The ware is then in the condition of *biscuit*, being white and porous, and readily absorbing water. B. 4 is a sample of biscuit ware.

This "biscuit" may now be painted with certain colours, which can be used *under the glaze*, that is, before it is covered with a preparation which in another "firing" forms a coating of glass, or it may receive transfers from engravings, thus producing *printed ware*. The colours which can be advantageously used "under the glaze" are few as compared with those employed

above it.\* In the latter case the paints used are enamel colours, that is, glasses of different kinds mixed with metallic oxides which give the required colour.† The printing is but the employment of the colours that can be advantageously used "under the glaze," mixed with oil and worked as ordinary printing ink for engravings. Care is required in manipulating the paper from which the print is transferred to the "biscuit," and in dexterously removing the paper after its application, so that the impression be not injured. To drive off the oil used as a vehicle for the colours, the ware after "printing" is exposed to a low heat in a kiln termed the *hardening kiln*, after which it is ready to be glazed. B. 4a is a piece of biscuit ware, painted with colours that may be used under the glaze; B. 5 is a piece of biscuit printed in blue; while the prints marked B. 7 are samples of the engravings on thin paper for transference to the biscuit.

The materials of the glaze, which may vary according to the practice at different potteries, are mixed with water, so as to form a substance of about the consistency of cream. Into this liquid the earthenware, either painted with colours which will not suffer by the heat of the kiln into which it is next placed, or printed with colours of the like kind, is dexterously dipped. Upon removal all traces of the colouring are lost under a thin general coating of the finely comminuted materials of the glaze, the water being readily absorbed by the porous "biscuit ware." It is now placed in saggers and exposed for about a day in the *gloss* or *glost kiln*, as it is termed, where it is subjected to a lower temperature than in the biscuit kiln, but at the same time a temperature sufficiently high to fuse the coating upon the ware, and so form a glass, which by its transparency discloses the painting or printing beneath, while by its imperviousness it prevents the access of liquids to the porous body. The earthenware is then ready for the market.

*Dip Ware.*—While referring to the manufacture of earthenware mention should be made of a very ingenious method, apparently in use long before the present white earthenware was invented, commonly termed *dip* or *dip ware*. This kind of earthenware is still made, although not to so great an extent as formerly, "printed" and "biscuit painted ware" being able to advantageously compete with it in lowness of price. In the manufacture of this ware, the body or paste after having been prepared as usual, is handed over to the "dip turner." This workman having received the "thrown" piece (a mug for instance) in its rough state, places it on a lathe, and takes off its

---

\* Cobalt blue, chrome green, &c. may be used under the glaze, as they are not altered by the heat of the *gloss* or *glost kiln*. Red from peroxide of iron cannot be thus applied, as the heat of the kiln converts the red into brown or black.

† These glasses are in general more readily fusible than is the kind of glaze employed, so that the latter is not injured by the firing, the enamel colour simply covering and sufficiently uniting with it. The glaze itself can be coloured with various metallic oxides. (See p. 37.)

inequalities, even giving it a pattern, if thought desirable, by engine turning. Having coloured clays (either natural or artificially prepared) of the consistency of cream in a vessel with a spout that can be varied in form, he blows into this vessel through another tube, and thus forces the creamy clay out of the first-mentioned spout upon the piece of clay turning slowly on his lathe. In this manner rings of coloured clay can be deposited on the revolving piece of ware, and by dexterously dropping portions of the creamy clays, patterns of different kinds and of different colours may be produced, great variety of design being thus obtainable. The arborescent or dendritic forms may also be produced by the "dip turner," who, after covering the turned piece of the original paste or body with an evenly-spread coating of his "dip" compound in its creamy condition, drops upon it, before it becomes dry, another kind of "dip" compound, having a greater density than the first, and thus, by holding the piece so that the heavier compound or colour can descend amid the moist first-spread "dip" he permits it to disseminate its particles in an arborescent form. The pieces thus prepared are then merely fired in the "biscuit" kiln, and glazed in the "gloss" kiln for the market.

The specimens B. 8 to 12, illustrate the successive stages in the manufacture of dip-ware.

### *Manufacture of Porcelain.*

The manufacture of porcelain bears a general resemblance to that of earthenware, the differences relating chiefly to the composition of the pastes or bodies and of the glazes, to the arrangement of kilns by which the more refractory materials are exposed to higher temperatures, and to muffles or kilns for firing the various enamel colours employed upon the different forms given to the porcelain. The materials for fine porcelain are ground with the greatest care to excessive fineness, and revolving magnets are often used to extract particles of iron, which would detract from the purity of the ware.

According to the analyses of M. Laurent, the general composition of the *Sèvres porcelain*, from 1770 to 1836, was that given in the following analysis, No. I., while No. II. shows the composition of the paste used for printing upon in 1843; the two being nearly identical:—

—				I.	II.
Silica	-	-	-	58.0	58.03
Alumina	-	-	-	34.5	33.94
Lime	-	-	-	4.5	4.58
Potash	-	-	-	3.0	2.97
				100.0	99.52

The substances usually employed to form the paste or body are kaolin, from St. Yrieix-la-Perche, near Limoges; china-stone, plastic clay from Abondant on the eastern edge of the Forêt-de-Dreux, the siliceous sand (nearly pure silica) of Aumont, near Creill, and chalk from the Colline-de-Bougivall.

According to the analyses of M. Laurent, the composition of the *Meissen (Dresden) porcelain* of 1825 chiefly differed from that of Sèvres in containing scarcely any lime, but more potash, as will be seen by the analysis No. III. With this may be compared the analysis No. IV. showing the composition of the *Berlin porcelain* of 1808; this shows that the proportion of silica in the Berlin ware was greater, while the per-centage of potash was lower than in the Meissen, but higher than in the Sèvres porcelain.

—	III.	IV.
Silica - - -	57·7	66·6
Alumina - - -	36·0	28·0
Potash - - -	5·2	3·4
Lime - - -	0·3	0·3
Protoxide of iron -	0·8	0·7
„ manganese -	traces	0·6
	100·0	99·6

The chemical composition of the various kinds of English porcelain had not until recently received much attention. Two kinds of English soft porcelain were analysed by Mr. Couper with the following results :—\*

—	V.	VI.
Silica - - -	39·88	40·60
Alumina - - -	21·48	24·15
Lime - - -	10·06	14·22
Protoxide of iron } -	26·44	15·32
Phosphate of lime }		
Magnesia - - -	—	0·43
Alkali and loss - -	2·14	5·28
	100·00	100·00

To Professor A. H. Church we are indebted for several analyses of English porcelain, of great interest as throwing light upon the materials employed at an early date in this country. The analysis here cited as No. VII. shows the composition of the semi-porcelain made at *Fulham* in the 17th century by Dwight, and proves that kaolin was not then used.† No. VIII.

\* "Philosophical Magazine," vol. xxxi. (N.S.), 1847, p. 440.

† "Some Points of Contact between the Scientific and Artistic Aspects of Pottery and Porcelain." Cantor Lectures by Prof. Church, *Journ. Soc. Arts*, vol. XXIX., 1881, p. 141.

is an analysis of some fragments of *Bow* porcelain, unglazed, dug up many years ago on the site of Messrs. Bell and Black's works, showing by the phosphoric acid that bone-ash had been employed.\* No. IX is an analysis of a piece of *Chelsea* porcelain, belonging to the early *Sprimont* period,† while No. X. shows the composition of the hard paste made at *Bristol* by Champion.‡

—	VII.	VIII.	IX.	X.
Silica - - -	79·5	40·0	40·2	62·92
Alumina - - -	12·5	16·0	8·4	33·16
Oxide of iron - - -	1·0	—	1·2	—
Lime - - -	1·5	24·0	27·4	1·28
Potash - - -	3·0	0·6	0·9	} 2·64
Soda - - -	1·5	1·3	1·0	
Phosphoric acid - -	—	17·3	20·3	—
	99·0	99·2	99·4	100·00

The ingredients employed in the manufacture of English porcelain are commonly Cornish or Devon kaolin, Cornish china-stone, and flint, with prepared bones. According to Aikin, the following was the composition of the body or paste of a Staffordshire porcelain, about the year 1840:—

Cornish kaolin - - -	-	-	-	-	-	31·0
Cornish china-stone - -	-	-	-	-	-	26·0
Flint - - -	-	-	-	-	-	2·5
Prepared bones - - -	-	-	-	-	-	49·5
						<u>100·0</u>

### *Potter's Wheel.*

As the potter's wheel has been so important an aid in the manufacture of pottery and porcelain, a slight notice of its progress among mankind seems desirable. After much discussion on the subject it would appear probable that the potter's wheel, like so many other things connected with the ceramic art, was derived from China. M. Brongniart inferred that the potter's wheel, after leaving China, where it had been long known, passed into Egypt by Scythia and Bactria, and through Scythia or Egypt itself to the Arabs of the Arabian peninsula and of Africa. He also considered that the evidence tended to show that it was introduced through Scythia, and nearly at the same time into Greece and its colonies in Southern Italy, reaching Etruria at a later date, and that it spread over the whole of Southern Europe, Rome, and its colonies, Spain, &c., as these

\* *Journ. Soc. Arts*, XXIX., 1881, p. 128.

† "South Kensington Museum Art Handbooks: English Porcelain." By Prof Church, Part I., 1889, p. 21.

‡ *Ibid.*, Part II., p. 70.

countries became civilised and acquainted with the arts of the East, stopping at the southern part of Germany, and only partially entering it; and that while penetrating into Gaul, it remained unknown among the ancient Scandinavian nations. None of the neolithic pottery found in this country shows any evidence of a knowledge of the potter's wheel; nor does that of the bronze age.\*

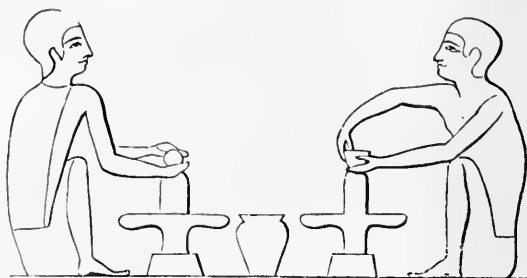


FIG. 1.

Representations of the potter's wheel in the tombs of Beni Hassan at Thebes (Fig. 1), show that the ancient method of employing it in Egypt was much the same as that common in most countries at the present day. In modern works where the wheel is used, steam-power is almost invariably employed; but the use of the wheel has to a great extent been superseded by improved methods of "moulding" and "pressing."

#### GLAZES.

[See specimens in Pedestal Case No. 5.]

The porosity of ordinary pottery, however valuable in hot climates for the purpose of cooling liquids,† was clearly in most cases a disadvantage, and led at a very early period to the use of a glazing, or thin glass covering, for the purpose of rendering the ware impervious to fluids. In the present state of our knowledge it appears difficult to fix a probable date for this invention, or even to attribute it to any locality. As regards the potter's art, so little is known of the early intercourse of the Chinese with the nations adjoining them, and of these again with the more western nations of antiquity, that even supposing the view taken of the progress of the potter's wheel to be approximately correct, and that early Chinese pottery was glazed, so that a knowledge of a process by which a glaze was formed would travel with the wheel, we still remain in doubt as to how far the first glazing of pottery can be traced to that people. The early

\* See Sir John Evans's "Ancient Bronze Implements," 1881, p. 487.

† Probably this application of unglazed ware was known in early times, seeing that the comparative coolness of water in porous vessels, from the reduction of temperature consequent upon the evaporation of the water percolating through their walls, would have been readily observed and appreciated in warm climates.

Chinese glazes do not appear to be known. Those which we see upon their ancient porcelain would seem to be derived from the same substances as those now employed, namely, mixtures in which felspar forms a chief ingredient, and which usually require "high firing," or considerable heat to melt them. Such glazes, however, would be little applicable to the ware of those ancient nations whose pottery has become known to us—ware which, for the most part, is not of a very refractory kind.

The composition of glazes requires to be such that when they are exposed to the heat necessary for vitrification they shall unite with the paste or body, and that in cooling they shall not split, crack, or *craze*, in consequence of their contracting during firing to such an extent that they cannot, when fired, completely cover the pottery or porcelain beneath. The glassy substances employed as glazes—metallic silicates and borates—firmly unite with the paste or body beneath, and thus a complete union is effected. The substances commonly used in the production of glazes are quartz, flint, felspar, gypsum (hydrous sulphate of lime, or calcium sulphate), borax (hydrous biborate of soda, or sodium diborate), boric acid, common salt (sodium chloride), potash, soda, and red oxide of lead. Some glazes are first formed into *frits*, or imperfectly vitrified bodies, and then pounded for use. Most glazes are either alkaline or lead glazes, the former being again separable into soda and potash glazes. Coloured glazes are formed with the addition of certain metallic oxides, such as those of manganese, copper, iron, chromium, cobalt, &c. Opaque glass or enamel is made, usually, with oxide of tin, sometimes with phosphate of lime, or, rarely, with arsenious acid.\*

### *Egyptian Glazes or Enamels.*

When or wherever the use of glazes may have originated, it is certain that they were employed at an early period in Egypt.† It would appear that the ware made, like ordinary unglazed Egyptian pottery, from the common clay of the Nile, would not readily adhere to such glazes or enamels as the Egyptians employed; and hence arose the necessity for introducing a different material, when it was proposed to glaze the surface. Accordingly we find that their small glazed figures and other ornamental objects are composed in the interior of grains of sand cemented together by some vitreous matter, commonly silicate of soda. Such a body could have very little plasticity; but although thus ill-suited to be worked on the lathe, it was readily stamped in

\* On the optical characters and artistic value of glazes the visitor may be referred to a paper "On Pottery Glazes: their Classification and Decorative Value in Ceramic Design," by Wilton P. Rix, *Journ. Soc. Arts*, vol. xli., 1893, p. 295.

† "Opaque glasses or enamels, as old as the XVIIth dynasty, and enamelled objects as early as the IVth, have been found in Egypt." "History of Ancient Pottery," by Samuel Birch, F.S.A., 1858, vol. i. p. 6.

moulds, and it is therefore by this means that most of the objects were formed. The blue, greenish-blue, and green glazes frequently seen on Egyptian ware appear to be due to a silicate of copper and sodium, or of copper and calcium. Glazed bodies of this character are known as old as the sixth dynasty.\*

Many examples of these blue-glazed objects are exhibited in the collection. C. 1 to C. 8 are the little sepulchral figures, called *shabti* or *ushabti*, which represent the deceased enveloped in bandages. The body is stamped with an inscription in hieroglyphics from the Ritual of the Dead. Each figure is mounted on a plinth, and supported at the back by a flat column.

According to analyses made in the laboratory of this Museum, the white body, seen in the fractured specimens, is composed of fine sand cemented by silicate of soda. The soda was probably introduced in the form of a carbonate (derived, perhaps, from the Natron Lakes), and, having been mingled with the sand, the mixture was moulded, fired, and glazed. The glazed frits are often, though incorrectly, known as Egyptian "porcelain."



FIG. 2.

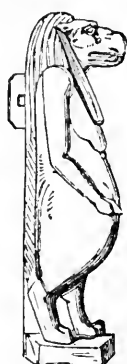


FIG. 3.

A beautiful turquoise-blue is seen on the little figure of Ptah-Sekeri-Hesar, C. 10 (Fig. 2), and on the small images of Ta-hur (Thoueris), C. 11 and 12 (Fig. 3). In some of the other specimens the glaze becomes more or less greenish, due probably to over-firing. The series includes a figure of Ra (the sun), C. 13; of Pasht (Bubastis), C. 14; of Tat, in shape of a Nilometer, the emblem of stability, C. 15; of a fish, C. 16; and of the Sacred Eye, C. 17.

The symbolical eye is found with Egyptian mummies, usually near the incision which was made for evisceration in the process of embalming.

The blue glaze was in some cases applied to objects carved in steatite and other substances, as seen in some of the scarabæi, C. 22. It may be noted that the elliptical base of each specimen is impressed or carved in intaglio, with hieroglyphics, and is bored through its longer diameter either for stringing or for mounting as a signet ring. The scarabæus, or sacred beetle of the Egyptians, was called *Kheper*, or "Creator."

The specimen C. 21 is a pectoral plate from a mummy, carved in a steatitic substance, coated with a glaze and inlaid with enamels. It presents the form of an Egyptian doorway with

\* "History of Ancient Pottery," by Samuel Birch, 1858, vol. i., p. 68.



recurved cornice, and has carved upon it, in low relief, a subject representing the adoration of the jackal of Anubis. The carved steatite was dipped into the cupriferous glaze, and then exposed to the heat necessary for vitrifying the glaze. Portions of a frit covered with a deep blue glaze, together with pieces of yellow aragonite, were then inlaid in cavities excavated in the steatite, thus filling up the general design. As these cavities are lined by the green glaze, it is evident that they were carved previously to the glazing. The pectoral plate was suspended from the neck of the mummy by a cord passing through apertures pierced in the cornice. The plates were known as *uta* or *uja*.

The female figure, with winged arms, *C. 22a*, is carved in wood, inlaid with coloured enamels and gilt. Some of these enamels present a turquoise-blue colour, similar to that of the cupriferous glazes on many of the foregoing specimens, whilst others possess a rich blue tint resembling a cobalt blue; it has, however, been proved by examination in the laboratory of this institution that this deep blue colour is produced by copper, and not by cobalt. Some fragments of the blue mosaic are tipped with a red enamel; all the pieces have been carefully ground to fit into the depressions carved in the wood. Traces of gilding, which are still to be detected on the figure, show that the elevated wooden partitions between the several pieces of enamel were originally gilt; and those portions of the figure which are not covered by mosaic work appear to have been enriched by painting and gilding.

The colouring matter of the blue enamels, illustrated by many specimens in this series, seems to be similar to that of the famous Egyptian or Vestorian blue, a frit which was largely used when ground as a pigment by the ancient Egyptians, from whom a knowledge of its use passed to the Romans. It is said to have been discovered by Vitruvius of Alexandria, who obtained it by heating a mixture of sand, carbonate of soda, and copper filings.\* Fragments of the frit have been found among Gallo-Roman remains in Brittany.† The art of producing this blue pigment seems to have died out, but in recent years it has been frequently reproduced. M. Fouqué has shown that it may be prepared without the use of any alkali, and has obtained a fine blue crystalline double silicate of copper and calcium, having the composition  $\text{CuO} \cdot \text{CaO} \cdot 4 \text{SiO}_2$ . This compound is interesting for the intense pleochroism which it exhibits in the microscope, being in one direction deep blue and in another direction of pale rose tint.‡ Prof. Flinders Petrie has recently presented to the Museum several specimens of the ancient blue frits with other pigments obtained by him during his explorations in Egypt. These have been examined chemically by Prof. W. J. Russell, F.R.S.

\* Journ. Chemical Soc., vol. lvii., 1890. Abstracts, p. 215.

† Bulletin Soc. Minéralogique de France, t. iii., 1880, p. 197; t. iv. 1881, p. 82.

‡ "Sur le bleu égyptien ou vestorien," par M. F. Fouqué. Bul. Soc. Min. Franco, t. xii., 1889, p. 36.

*Assyrian and Babylonian Glazes.*

The glazed ware of Assyria and Babylonia was inferior in every respect to that of Egypt. Many of the specimens which have come down to us show the application of a coloured glaze or enamel to the surface of bricks for the purpose of ornamental architecture,—an application which was probably derived by the Assyrians from the Egyptians.

A large Babylonian brick, C. 23, (Fig. 4\*), presented by the Council of the Royal Institution, shows the character of the material when unglazed. The brick is stamped with a cuneiform inscription which has been translated as follows:—

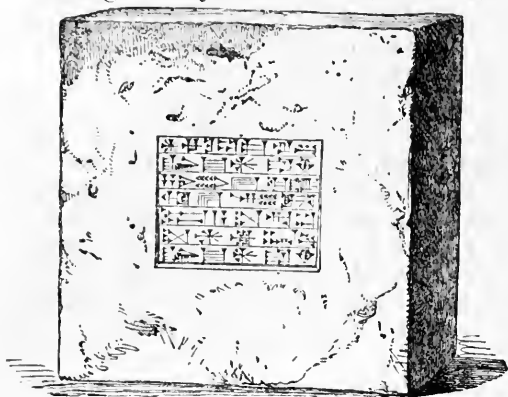


FIG. 4.

Nebuchadnezzar  
King of Babylon  
Restorer of Bitzagal  
And Bitsidda  
Eldest Son  
Of Nabopolassar  
King of Babylon.

The specimens C. 24 and 25 are fragments of enamelled bricks, presented by Sir Henry Layard; the former from Nimroud (Nineveh) and the latter from Khorsabad, Assyria; whilst the specimens C. 26 to 28 are pieces of similar enamelled bricks, from Babylon, collected and presented many years ago by the late Mr. W. Kennett Loftus.

Examination of the glazes on these bricks, by the late Dr. Percy at this institution, showed, as regards the specimens of Babylonian bricks, that with a soda-glass, or silicate of sodium, an opaque white colour was obtained by the use of oxide of tin, while a yellow was produced by means of antimony and lead (antimoniate of lead, or "Naples yellow"). The blue colour derived from copper was previously well known, but the occurrence of lead in the blue enamel, oxide of lead probably having been employed as a flux, had not been previously ascertained. From the manner in which the Babylonian bricks are coated, the glaze having run over and down the sides, it would appear as if the glazing composition had been applied while the face of the brick to be glazed was horizontal, and that this position of the surface was maintained when the brick was fired, in order to vitrify the composition. The Assyrian enamelled bricks in this collection appear to show that similar glazes or enamels were probably employed by the Assyrians at a still earlier date. The bodies of all the Assyrian and Babylonian bricks mentioned above contain calcareous matter.

\* This woodcut, from Birch's "Ancient Pottery," 1873, Fig. 87, has been kindly furnished by Mr. Murray.

*Indian Enamels or Glazes.*

The Egyptian method of enamelling frits composed of siliceous sand cemented by some alkaline silicate seems to have been introduced into India by the Moham-medans. A specimen, C. 29, (Fig. 5) from the tombs of the Kootub (Shahee Dynasty), Golconda,

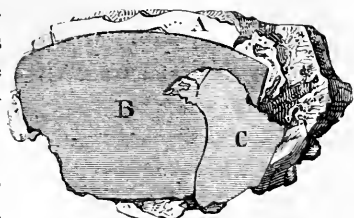


FIG. 5.

which may be referred to about the 15th century, was presented many years ago by Major Oliphant. In this specimen the frits are enamelled with differently coloured glasses, and the enamelled frits then cut so as to form a design in mosaic when embedded in a wall of chunam or plaster. A portion of a bird (C) is represented in yellow on a turquoise-blue ground (B) with a margin of white (A). The blue colour, probably formed by a silicate of copper and soda, as in the Babylonian brick, closely resembles the turquoise-blue of the Sèvres porcelain. These enamelled frits have been used in India from the 13th century, and it is said that they are still made in Scinde.

*Greek Glazes.*

It has been supposed that the black glaze employed in the ancient Greek vases, especially those found in the Campania, is due in great part to volcanic ashes, which were spread by the brush over the required portions, the vases being then exposed to the heat necessary for the fusion of the ash. The white and other colours used upon these vases are not enamels, but coloured clays or *engobes* painted on the vases after the design had been sketched. Among the splendid series of specimens in the British Musum, there are some pieces showing, in those places where the engobes have peeled off, a freedom of hand which much surpasses that exhibited by the finished work, as might, indeed, be expected from the greater difficulty of working with coloured clays of the proper consistency. According to M. Salvétat, who analysed the black glaze of some Greek pottery (Campanian), it had the following composition :—

Silica	-	-	-	-	-	-	-	46·3
Alumina	-	-	-	-	-	-	-	11·9
Lime	-	-	-	-	-	-	-	5·7
Magnesia	-	-	-	-	-	-	-	2·3
Soda	-	-	-	-	-	-	-	17·1
Oxide of iron	-	-	-	-	-	-	-	16·7
								100·0

The quantity of soda in this compound, which otherwise does not very materially differ in constitution from some volcanic ashes, might lead to the supposition that it had been added as a

flux. The whole, indeed, may have been artificial, but whether natural or artificial, its use in painting on these vases illustrates the application of a glaze to Greek pottery for ornamental purposes.

A small, but characteristic series of specimens is exhibited in the glass cases which stand on the bridge over the staircase leading from the Hall.

The early Greek vase C. 30 (Fig. 6) was found at Vulci, in Etruria, and may be referred to about 700 B.C. It illustrates the mode of decoration generally employed on such ware. On the body of the vase, which is reddish, figures were first sketched in red, then coloured by black glaze, and fired; engobes of white and red were added in certain parts, and portions of the figures were picked out by scratching through the glaze with a point.



FIG. 6.



FIG. 7.

A similar mode of decorating is illustrated by the fine *hydria*, or water-vase, C. 31 (Fig. 7), found also at Vulci. This piece, ornamented with highly artistic designs, may be dated between 500 and 400 B.C.

The two *amphoræ*, C. 32 and 33 (Figs. 8 and 9) were both obtained from Vulci, and furnish further illustrations of the same method of ornamentation. The *amphora*, C. 34

(Fig. 10), from Ruvo, near Naples, is not so ancient as the former specimens, and may probably be referred to about 300 B.C. The figures on this piece are left in red, whilst the ground is painted with a black glaze.



FIG. 8.



FIG. 9.

A similar style has been employed in the decoration of some of the following specimens, such as the large *oxybaphon*, C. 36 (Fig. 11), which was also found at Ruvo.



FIG. 10.



FIG. 11.

The *amphora*, or wine jug, C. 38 (Fig. 12), is of red body, completely coated with black glaze and ornamented around the neck with *engobe*, whilst the similar vessel with trefoil lip, C. 38 (Fig. 13), is also covered with the black glaze. Both specimens were found in the Campania.



FIG. 12.



FIG. 13.

Several examples of the Greek *cylindrus*, or double-handed tazza, are exhibited in the collection, and as these are usually decorated with paintings on the under side, they are placed on a glass mirror which enables the design to be readily seen by



FIG. 14.



FIG. 15.

reflection. The specimen C. 42, from Vulci, in Etruria, is represented in Figs. 14 and 15. Another kylix from Vulci is



FIG. 16.



FIG. 17.

marked C. 43, and depicted in Figs. 16 and 17. The fine specimen, from Ruvo, near Naples, marked C. 44, is elegantly decorated on both sides, as seen in Figs. 18 and 19.



FIG. 18.



FIG. 19.



The figures 20 and 21 represent the upper and under sides of an elegant little cylix, found at Nola in the Campania, and covered with black glaze, but not decorated with any painted design (C. 46).

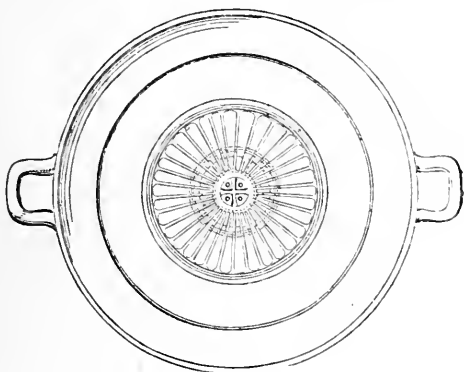


FIG. 20.

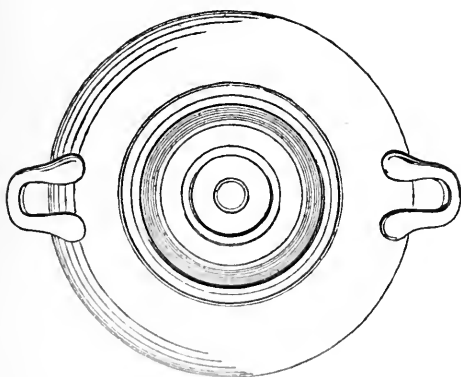


FIG. 21.

The Etruscan *cantharos*, C. 49 (Fig. 22), and the *scyphos*, C. 50 (Fig. 23), are examples of a black ware, with smooth external surface, apparently due to a very thin coat of glaze.



FIG. 22.



FIG. 23.

### *Lead Glazes.*

Lead has been found, as previously stated (p. 40), in the enamel or glaze of the Babylonian bricks. Brongniart refers to

a Roman lamp in the *Bibliothèque Impériale* at Paris of about the second or third century of the Christian era, with a green cupreous glaze containing lead; as also a small statuette of Venus Anadyomene, supposed to be less ancient than the lamp, in like manner covered with the green glaze containing lead. The Arabs employed a plumbiferous glaze in the ninth century, for some fragments of Arab pottery of that date, in the Ceramic Museum at Sèvres, have a lead glaze. Two broken vases now preserved at Sèvres which were taken from a tomb of the date of 1120 in the celebrated Abbaye de Jumièges, have plumbiferous glazes, the one yellowish and the other a brilliant green. How far these vases may have been manufactured in France is uncertain; but if the statement of Passeri be well founded, that in 1100 a lead glaze was produced on the pottery then manufactured at Pesaro by covering the body or paste with oxide of lead, plumbiferous glazes must have been employed in Europe in the early part of the 12th century. Lead glaze was in use in Alsace in the 13th century. Stazlstatt, who died in 1283, is commonly reputed to have been the first person in Alsace, who glazed fictile ware with lead.

The Moors introduced their lead glaze into Spain in the 13th century, and about that time its use seems to have spread in different countries. The tiles used in the French castles and abbeys of the 13th century (Abbaye de Voulton, near Provins, Fontainebleau, Château de Gisors, St. Etienne d'Agen) were covered with a lead glaze, as also were the various Norman tiles which have been used in the churches and castles of England. These tiles date back to the early part of the 13th century, and seem to have been very commonly employed in the 14th, 15th, and 16th centuries, and even later.

A series of *encaustic tiles*, with geometrical and heraldic designs, is exhibited under the reference-numbers C. 52 to 66. These tiles were obtained from Droitwich and Malvern, in Worcestershire; from Reading Abbey and East Hampstead Park in Berkshire; from Castle Acre in Norfolk; and from Tavistock in Devonshire. The design was impressed in the clay, and the hollows filled in with clays of various colours, the entire surface being then coated with a lead glaze. It has been suggested from the artistic character of some of the designs, so far in advance of those on the contemporaneous domestic pottery, that the inlaid tiles were probably made—at least in some cases—in the religious houses themselves.\*

Lead glazes were largely employed at a later period in the Staffordshire and other potteries of this country, as will be seen by reference to many of the specimens in the collection; and they still continue to be much used for glazing common earthenware, although it is desirable to avoid as much as possible such

---

\* "South Kensington Museum Art Handbooks: English Earthenware." By Prof. A. H. Church, M.A., Part I., 1884, p. 12.

glazing on vessels used for domestic purposes. The following may be taken as examples of the composition of the plumbiferous glazes used for ordinary English earthenware :\*

	Cream-colour Glaze.	Printed Ware Glaze.
Carbonate of lead - - - - -	66	45
Cornish china-stone - - - - -	22	28
Flint - - - - -	12	13
Flint glass - - - - -	—	14
	100	100

The annexed are examples of glazes containing lead used for some of the soft English porcelains :—

I.—Cornish china-stone, 100 parts, calcined flint, 60 parts, carbonate of lime, 25 parts, Cornish kaolin, 10 parts, soda, 10 parts, borax 60 parts, and carbonate of lead, 30 parts.

These substances are fritted together with 20 per cent. of carbonate of lead, and 10 per cent. of flint.

II.—Cornish china-stone, 34 parts, chalk, 17 parts, flint, 15 parts, and borax, 34 parts.

These materials are fritted together and the glaze formed of 69 per cent. of the frit, 10 per cent. of Cornish china-stone, and 21 per cent. of carbonate of lead.

### *Tin Glazes or Enamels.*

When certain infusible substances, in a finely divided state, are introduced into the substance of a glaze, the particles remain mechanically suspended in the vitrified product, which thus acquires more or less opacity. Binoxide of tin, or stannic oxide, employed in this manner produces an opaque white enamel, which has been largely applied to the glazing of certain kinds of pottery, since it forms a surface well adapted to receive painting. It is generally supposed that the use of tin for this purpose originated with the Persians and Arabians, but it has been shown that stanniferous glazes were used in Assyria and Babylon (p. 40). We are not aware that such glazes have been found among the productions of the ancient Chinese. Brongniart infers that tin glazes or enamels were known to the Arabs of Northern Africa in the ninth century. From the evidence of the bricks with stanniferous glazes from Babylon and Nineveh, the use of such glazes may readily have been derived from the countries east of the Mediterranean. The tiles employed at the tomb of Mahomet at Medina built in 707, have, however, neither tin nor lead in their glaze.

\* "Chemical Technology," by Dr. F. Knapp, edited by Dr. E. Ronalds and Dr. T. Richardson, vol. ii., p. 477.

It seems clear that stanniferous glazes were introduced into Europe by the Arabs or Moors during their power in Spain. There still remain some beautiful works in enamel tiles in that country, especially at the Moorish palace of the Alhambra, where many of the tiles are coated with a stanniferous glaze. The dates of the earlier of these tiles at the Alhambra would range from 1273 to 1302. Tiles of a like general kind are still manufactured at Valencia. It has been suggested by Mr. Drury Fortnum that the occurrence of tin-ore in Spain may have led originally to the accidental discovery of tin glazes or enamels.

Five fragments of tiles from the Alhambra, are exhibited as C. 82 to 86, and two from the Alcazar at Seville. As a typical example, the tile C. 82 may be referred to. Upon the face of the tile, which is of a reddish paste, a coating of white opaque stanniferous enamel was spread, and upon this white surface, after firing, the design was painted in blue and brown enamels.

*Majolica Ware.*\*—Though Moorish tiles were probably introduced into Italy at the conquest of Majorca by the Pisans in 1115, and such tiles were sufficiently esteemed to be employed for ornamental purposes in the churches of Pisa and other places, it is by no means clear when and how a knowledge of tin glazes passed into Italy. It has been generally considered that they were first used by Luca della Robbia, the Florentine sculptor, so celebrated for his terra-cotta figures and bas-reliefs covered with stanniferous glazes. Della Robbia was born about the year 1400, and was eminent as a sculptor in bronze and marble before he modelled in clay for terra-cottas. He died in 1481. During his lifetime, and for long after his death, similar work was executed by his assistants Ottoviano and Agostino, his nephew Andrea, and his great nephews Giovanni, Luca, and Girolamo. The colours which these masters employed were yellow, opaque blue, green, and violet.

Although Luca della Robbia has usually been regarded as the first to employ stanniferous glazes in Italy, it is not improbable that he may have derived his knowledge of such glazes from the early samples of Italian Majolica ware, with are coated with a similar enamel, and are apparently of an age contemporaneous with that of Della Robbia's earliest efforts in this direction.† The early examples of Majolica or "Raffaelle" ware resemble the Moorish pottery from which it took its origin. The term Majolica, is, indeed, derived from Majorca,—an island which, according to Fabio Ferrari, was called Majolica by the ancient Tuscan writers, and whence this kind of pottery was introduced into Italy. The popular designation of Raffaelle ware, has

---

\* Reference may be advantageously made by the student to a fine work on Majolica and allied wares, published for the Science and Art Department, and entitled "A Descriptive Catalogue of Maiolica, Hispano-Moresco, Persian, Damascus, and Rhodian wares in the South Kensington Museum; with Historical Notices, Marks, and Monograms. By C. Drury E. Fortnum, F.S.A.," 1873, pp. 698.

† "Catalogue of the Soulagès Collection," by J. C. Robinson, F.S.A., 1857, p. 52.

arisen from its decoration having been in some cases copied from designs after Raffaele.\*

The process of manufacturing Majolica ware has been described by Passeri, who wrote in the middle of the last century.† After the body or paste had been fired, it was coated with a white clay or earth and a composition of oxide of lead and oxide of tin, the proportion of tin being increased as the enamel was required to be whiter and harder. This manufacture was in the most flourishing state from about 1540 to 1560, and declined greatly in importance after 1574. Duke Guid' Ubaldo II. of Urbino greatly encouraged its manufacture, giving to his works designs by Raffaele and his pupils. The towns of Urbino, Gubbio, Pesaro, Castel Durante, and Faenza were the most celebrated for their production of this ware, but, the manufacture was extended to other places in Italy. Some of the early ware known as *Mezza Majolica* is not glazed with tin, but is formed of a coarse body which has been coated with thin white slip, on which the painting was executed and afterwards covered with a lead-glaze. Such ware is often decorated with colours which present peculiar iridescent and metallic lustres. It appears indeed that the term *Majolica* was originally restricted to ware having such lustres applied to a tin-glazed surface, and even some modern authorities have advocated the limitation of the term to its original use. Among the early *Majolica* lustres the famous ruby has been considered peculiar to one artist Maestro Giorgio, of Gubbio; and although it appears that he was not the inventor of this glaze, he nevertheless so appropriated it that many *Majolica* painters are believed to have sent their productions to M. Giorgio in order that he might enrich them with the celebrated lustre.‡ According to Brongniart, there is no colour on the *Majolica* ware due to any preparation of gold.§

Only a few pieces of *Majolica* ware are here exhibited, and the visitor seeking other examples may be referred to the valuable and extensive collection in the South Kensington Museum. The circular plateau, or *bacile*, C. 90, is a specimen of *Mezza Majolica*, having the centre grounded in white and painted in blue with a female bust-portrait in profile, enriched

\* It is probable that Raffaele himself neither painted on *Majolica* ware nor furnished designs for its decoration. A letter has, however, been attributed to Raffaele, in which the Duchess of Urbino is informed that the designs are ready which she had desired for her sideboard. It is certain that the Raffaele who wrote this letter could not have been the great master, inasmuch as the latter had been dead long before the period to which the letter may be referred (Murray's "History of Pottery and Porcelain," 3rd ed., 1868, p. 35). Some of the designs of *Majolica* ware are considered to have been taken from the engravings of Raffaele's works by Marco Antonio.

† "Istoria della Pitture in Majolica fatte in Pesaro e nel luoghi circonvicini," a work first printed in Venice in 1752, and reprinted at Bologna in 1775. Another edition, edited by Ignazio Montanari, appeared in 1833. All these are exceedingly scarce. A translation in French, with an appendix by the translator, M. Delange was published in Paris, December 1853.

‡ "Catalogue of the Soulagès Collection," by J. C. Robinson, F.S.A., p. 4.

§ The gold purple, or "purple precipitate of Cassius," was not known until 1585.

with yellow metallic lustre washed over the costume and head-dress; the rayed border is painted in blue and white with yellow lustre; while the reverse is coated with coarse yellowish-brown glaze. It is believed that specimens decorated with these lustres were made only at three localities—Pesaro, Gubbio, and Deruta. Pieces of Majolica ware intended as lovers' presents were often painted with portraits and appropriate inscriptions, and are known as *Amatorii Majolica*. This specimen although of coarse body, and called Mezza Majolica, appears to be coated with a tin-enamel.

The Mezza Majolica plate, C. 91, is decorated in the centre with a large floriated initial E, outlined in blue, painted with brown iridescent *madreperla* lustre, and enriched with crimson or ruby lustre. Its date may be fixed between 1510 and 1520. This piece was probably decorated at Gubbio, where Maestro Giorgio is believed to have monopolised the use of the ruby lustre. These lustred pieces were the true old Majolica; the term, says Mr. Fortnum, "was originally applied only to wares having the lustre enrichment; and it is probable that this distinctive appellation was more or less in use until the decline of the manufacture." "The method of producing these metallic effects may here be briefly repeated from the description in the supplement to Piccolpasso's work. He there states the ingredients of the pigments as communicated to him by Maestro Vincenzio of Gubbio, and explains the method of building the furnace in which the pieces to be lustred after baking are exposed to the action of hot smoke, produced by the burning of faggots of broom and brushwood. This smoke, being carbon in a highly-divided state, coming into contact with these pigments on the heated wares, reduces the metallic salts, leaving a thin surface of the metals, which being of a mixed nature and blended with other ingredients, produce those varied and beautiful tints."\* Mr. W. de Morgan's recent reproductions of the old lustres are noted at p. 62.

In the plateau C. 92 we have a sample of Majolica ware of the best period. This piece is painted in colours with a design representing C. Mutius Scævola burning his right hand before King Porsenna. The reverse is inscribed in blue "G. V. V. D. Munus F. Andrea Volaterrano. Mutio ch' la sua destra erante cocie." This *bacile istoriato*, which is a good example of the best style of Majolica ware and is useful as showing the colours employed, was made at Pesaro in the duchy of Urbino, and bears on the rim the arms of the Duke Guid' Ubaldo of Urbino. The initials on the back are those of "Guido Ubaldo Urbini Dux," and the inscription may be rendered, "Presented to Frate Andrea of Volterra," the rest being merely descriptive of the scene depicted on the front. Collectors are familiar with other pieces of this service, which, it is believed, was made in 1545 at the *botega* of Lanfranco in Pesaro.

---

\* Fortnum's "Descriptive Catalogue," 1873, pp. 180, 181.

Another plateau of the best period is marked C. 93, and is painted in colours with a group of astrologers, and youth in costume of the period playing an organ, while an attendant blows the bellows. The reverse is inscribed in blue, "ASTROL OGIA, 1545."

The next piece, C. 94, is a Majolica plate ornamented in colours, with three shields of arms on the rim. The reverse is painted with scale pattern in orange on yellow ground, the white centre being inscribed in blue, "MDXX XIII · F · ATHAN ASIVS · B · M." Similar specimens have been attributed to Baldasara Manara, of Faenza, to whom the initials B. M. probably refer, while the F. may stand for Faenza. This piece is useful, not only as illustrating the colours employed, but also as showing by a finger-mark that the stanniferous ground and colours upon it were in a thick pasty state before firing. By a careful inspection of the three preceding specimens, it will be observed that the only colours employed are blue, yellow, light brown, and bluish black, with their mixtures.

The coloured design on the plate, C. 95, is emblematical of the subjection of Science to Love; and the reverse is inscribed, "*Amor crudele con sue uoglie prave fecie Aristotil portar freno e sella*, 1547." It is notable that the blue colour of part of this inscription is brought out only where the glaze passes over the writing.

On the plate, C. 96, the design is painted in dull-green camaieu, with touches of yellow introduced in the sky. In the central concavity is a cupid, and on the broad border the Rape of Proserpine. The reverse is ornamented with scrolls painted in blue on a white enamelled ground, and bearing the artist's monogram. Mr. Fortnum, who has copied this monogram in his Catalogue, p. 456, has pointed out that it corresponds with the mark on a Majolica plate, which also bears an inscription with the place and date of manufacture; *Fabriano, 1527*. Specimens of this manufacture are extremely rare.

The plate, C. 98, of Siena manufacture, is an example of Majolica ware of rather later date than the pieces previously noticed. It is ornamented in colours as represented in Fig. 24.

*Palissy Ware.* — The celebrated ware made by Palissy was coated with a stanniferous glaze, the production of which cost him much labour, and upon this glaze coloured



FIG. 24.

enamels were employed. Bernard Palissy was born of poor parents at La Chapelle Biron, in Perigord, about the year 1510. He was a most enterprising man, and while working at glass-painting and land-surveying for a subsistence, studied geology, chemistry, and other branches of science. Having seen a beautiful cup of enamelled pottery, he laboured to discover the secret of its enamel. For 16 years he vainly attempted to imitate it, spending in these attempts all his money, and involving himself in much misery. Success, however, finally crowned his efforts. He died in confinement in the Bastille about the year 1589.

Palissy's "rustic ware," which has become extremely famous, is remarkable for its decorations in relief, truthfully modelled and coloured from natural objects in the neighbourhood of Paris, such as reptiles, fishes, leaves, and even the fossil shells of the district. An example of this ware is furnished by the oval dish, C. 101. In the centre is a fish, modelled in high relief and surrounded by fern fronds and aquatic plants, with a lizard, frog, snake, insects, and freshwater shells (*Planorbis*, *Paludina*, &c.), all coloured in enamels from nature. In addition, however, to this characteristic relief ware, Palissy produced a great variety of different kinds of pottery.

*Delft Ware.*—The famous Delft ware was coated with a stanniferous glaze or enamel, upon which the designs were executed chiefly in blue. Only a single specimen of this ware is here exhibited, in order to show the character of the glaze, but a collection of interesting examples will be found in the lower part of Wall Cases XXXV. to XLIV. From Holland the manufacture of Delft ware was introduced into this country, and specimens made at Lambeth, Bristol, Liverpool, and other English localities are described under their respective places of manufacture. The punch-bowl, No. S. 10 (p. 173), is interesting as bearing a motto alluding to the use of tin in the enamel.

It is remarkable that the bodies or pastes employed by Luca della Robbia, and by the manufacturers of the Majolica and Delft ware, are so nearly alike in composition, as to suggest a suspicion that a knowledge of their constitution may have been derived one from another. The Palissy ware is, however, differently composed, containing less calcareous matter than the others, and consisting almost wholly of silica and alumina. The following analyses of these several wares are given by M. Brongniart, the analyses having been made at Sèvres:—

	Luca della Robbia.	Majolica.	Delft.	Palissy.
Silica - - -	49·65	48·00	49·07	67·50
Alumina - - -	15·50	17·50	16·19	28·51
Lime - - -	22·40	20·12	18·01	1·52
Magnesia - - -	0·17	1·17	0·82	—
Oxide of iron - -	3·70	3·75	2·82	2·05
Carbonic acid and loss -	8·58	9·46	13·09	0·42*

\* This quantity represents loss, and not carbonic acid.



*Felspathic Glazes.*

A knowledge of Felspathic glazes, or those in which felspar forms a more or less prominent ingredient, seems to have been introduced into Europe with that of the composition of the Chinese porcelain pastes or bodies; so that as European imitations of the latter extended, the use of felspathic glazes also spread. These glazes usually require a far greater heat for their fusion than is required for those which are employed on ordinary earthenware.

The Chinese glazes are variously composed, but consist chiefly of petrosilex (a quartz-felspathic rock), the fusibility of which is increased by the addition of lime, fern-ashes, and powdered gypsum (*che-kao*). These materials, finely powdered and carefully mixed, are suspended in water, and the mixture applied directly to the ware in its raw or unbaked state, the method being, therefore, essentially different from that followed in European manufactories, where the porcelain is never glazed until it has been brought to the state of "biscuit" by firing.\*

The felspathic glazes of Chinese porcelain are illustrated by the specimens C. 104 to 116. Of these specimens, the first is a tile from the famous Porcelain Tower at Nankin, which is assigned to the date 1411.

Although, doubtless, many modifications may have been made in the glazes employed at Meissen (Dresden) since the first European porcelain works were carried on at that place at the commencement of the eighteenth century, yet the glazes still used there are interesting, as probably pointing in some measure to the composition of those early employed. The following has been given as the Meissen glaze of 1836, and it will be noticed that it is destitute of felspar:—

Calcined quartz	-	-	-	-	-	37.0
Kaolin of Seilitz, calcined	-	-	-	-	-	37.0
Compact limestone of Neumtansdorf, near Pirna	-	-	-	-	-	17.5
Pieces of porcelain	-	-	-	-	-	8.5
						<hr/> 100.0 <hr/>

The glaze of the Berlin porcelain had, in 1836, the following composition:—

Kaolin of Morl	-	-	-	-	-	31
Quartz sand	-	-	-	-	-	43
Gypsum	-	-	-	-	-	14
Pieces of porcelain	-	-	-	-	-	12
						<hr/> 100 <hr/>

\* For the composition of Chinese glazes, see M. Stanislas Julien's translation from the Chinese, entitled "*Histoire et Fabrication de la Porcelaine Chinoise*," Paris, 1856, p. 130.

Prior to the year 1780 the glaze employed at Sèvres was compounded as follows:—

Biscuit	-	-	-	48
Sand from Fontainebleau	-	-	-	40
Chalk from Bougival	-	-	-	12
				<hr/>
				100
				<hr/>

Since that date, however, the use of an artificially-prepared glaze has been abandoned, and recourse had almost exclusively to the pegmatite of St. Yrieix, near Limoges, a rock composed of felspar and quartz. According to the analyses of M. Salvétat this rock has the following chemical composition:—

Silica	-	-	-	74.3
Alumina	-	-	-	18.3
Potash	-	-	-	6.5
Lime	-	-	-	0.4
Magnesia	-	-	-	0.2
Loss	-	-	-	0.3
				<hr/>
				100.0
				<hr/>

For the glazes of English porcelain Cornish china-stone usually forms an important ingredient, a frit being not unfrequently made with this rock, associated with borax, flint, lime, or other substances. Formerly lead was more employed in such glazes than it is at present.

The Society of Arts in the session 1819–20 offered a premium to the person “who shall discover to the society the cheapest, “safest, most durable, and most easily fusible composition fit “for the purpose of glazing earthenware, without any prepara- “tion of lead, arsenic, or other pernicious ingredients, and “superior to any hitherto in use.” In the following session the Isis Gold Medal was awarded to Mr. John Rose, of Coalport, Shropshire, for an improved glaze for porcelain, having the following composition:—

	Parts.
Felspar from Welshpool, Montgomeryshire	- 27
Borax	- 18
Sand from Lynn, Norfolk	- 4
Cornish china-clay	- 3
Nitre	- 3
Soda	- 3

This mixture was fritted, and three parts of calcined borax then added.\*

A sample of this glaze is seen on the specimen C. 119, which bears the following inscription, printed in red:—“Coalport “Improved Felspar (*sic*) Porcelain; patronized by the Society “of Arts; the Gold Medal awarded May 30, 1820; J. Rose “and Co” (*See also* Coalport porcelain, p. 147.)

\* Transactions of the Society of Arts, vol. xxxviii., 1821, p. 42.

Felspar and felspathic rocks have ever since been largely used in the glazes of English porcelain. Most of the felspar now used is imported from Norway and Sweden.

The following formula was given by Drs. Ronalds and Richardson,\* as producing a porcelain glaze considered excellent in 1848 :—

	Parts.		Per cent.
Cornish china-stone	25	Fritted in glass-oven, and then the following mixture used :	Frit - - 26
Soda - - -	6		China-stone - - 26
Borax - - -	3		White lead - - 3
Nitre - - -	1		Flint - - 7
			Carbonate of lime 7
			Oxide of tin - - 3

At one period the famous Worcester porcelain was coated with a glaze of the following composition :—Red lead, 38 ; sand, 27 ; flint, 11 ; carbonate of potash, 15 ; and carbonate of soda, 9. This glaze, however, was long ago displaced by a composition in which China-stone and borax play an important part.

The constituents of the glaze, having been mixed in the proper proportions, are fritted in a kiln, and the molten mass run into water, whereby it becomes disintegrated. The powdered frit is mixed with borax and other materials, and the mixture ground in a mill. In order to secure complete incorporation of the materials and reduction to an extreme state of division, the grinding has in some cases to be continued for as long as 10 days.† The finely-divided glaze is suspended in water so as to form a liquid of the consistency of cream, into which the biscuit ware is dipped. After the pieces have been dried in an oven, they are trimmed to remove any superfluous glaze, and are then fired for many hours in the glost kiln, whereby the glaze fuses and forms a thin smooth coating, uniformly spread over the surface of the porcelain, which is then ready for decoration by the painter and gilder.

#### *Salt Glaze.*

It is generally believed that salt glaze, or one in which common salt by its volatilisation amid the biscuit ware produces the glaze, was first employed by Messrs. Palmer and Bagnall, at their potteries at Burslem, in Staffordshire, about the year 1680.

Salt glazing is effected towards the end of the firing by throwing common salt (chloride of sodium) into the kiln containing the ware, through apertures made for the purpose. At the high temperature of the kiln the salt is volatilised, and its vapour thus surrounds the various vessels which are being baked. The vapour of the sodium chloride, the silica and silicates, in the paste of the ware, and the watery vapour which is always present, react upon one another, the hydrogen of the water forming, with the chlorine of the salt, hydrochloric acid,

\* See the additions to their translation of Knapp's "Chemical Technology," vol. ii., p. 466.

† "A Guide through the Royal Porcelain Works, Worcester."

which passes off in the state of vapour, while the oxygen of the steam uniting with the sodium produces soda, which forms a silicate on the surface of the ware, so that the biscuit becomes coated with a thin layer of silicate of sodium, or soda-glass. Lead is in some cases associated with the salt glaze.

The old salt-glazed ware of Staffordshire is described on p. 96; and a large series of characteristic specimens, obtained mostly from the Enoch Wood Collection, is exhibited in the lower part of Wall-cases, I. to V. The early Fulham stone-ware, of Dwight's manufacture, was also salt-glazed.

As salt glaze requires for its production a very high temperature, and is not considered so generally applicable as other glazes, it is employed at present only for special purposes. For vessels required to contain acids and other corrosive liquids, salt-glazed stone-ware is largely employed; and it is also used for drain and chimney pipes, and for the stone-ware insulators of the wires of electric telegraphs. When the body of the ware contains iron, as is commonly the case with impure clays, the stone-ware will present various shades of yellow and brown, often of much richness. The surface of salt-glazed ware is also characterised by a peculiar granular texture, somewhat resembling that of orange-peel.

Sir Henry Doulton's remarkable application of stone-ware to decorative purposes receives due notice at p. 170, in connexion with the description of the history and productions of the Lambeth and Vauxhall potteries.

### *Smearing.*

Smearing, as it is termed, is produced by the evaporation, or volatilisation, of certain glazes in closed saggers. Thus in the earthenware kilns, where common glazes are employed upon the ware, if the saggers be closed, and the heat be sufficient, other biscuit-ware placed in the saggers may be slightly covered with a coating of glaze, or be "smeared," by the evaporation from the glazes. Certain compositions may also be placed in the bottom of the closed saggers, and by their evaporation the ware in them may be smeared or semi-glazed. Various mixtures are employed, and common salt is sometimes added; for example, the following composition may be used:—Common salt, 67; potash, 38; oxide of lead, 5.

### COLOURS.

[See specimens in Table Case 3; east side.]

In the preparation of the materials used for painting on pottery and porcelain the colouring agents are usually mixed with some vitrifiable substance, or flux, which on fusion causes the colours to adhere to the surface, and at the same time serves as

a protection by covering them with an impervious glaze. Since organic and volatile colours would suffer more or less alteration upon exposure to the temperature necessary for the fusion of the flux, their use is obviously excluded, and the range of colours available for ceramic decoration is therefore confined to certain metallic oxides and salts. In some cases the colouring agents remain mechanically suspended in the flux, which thus serves merely as a vehicle; while in other cases the oxides form fusible silicates or borates by entering into chemical combination with certain constituents of the flux with which they are mixed, or of the paste to which they may be applied: examples of mechanical suspension of colours are afforded by the greens from oxide of chromium and by the reds and browns from peroxide of iron; while examples of chemical combination are furnished by cobalt and copper colours, the silicates, and not the oxides, of these metals being the true colouring agents.

In some modes of ceramic decoration the artist employs coloured clays, or slips, the pigment becoming incorporated in the body of the ware. Such *encaustic colours* were used by Wedgwood in the decoration of some of his basaltes, or black ware (p. 104). Coloured slips are in like manner used in the favourite style of decoration called *pâte sur pâte*. Most pottery-pigments, however, are *enamel colours*, or, in other words, the colouring matter is associated with a fusible material, which, when fired, vitrifies as a coloured glass.\*

Obviously the most durable mode of decoration would be that of applying the colour to the ware when in the state of biscuit, since it would then be protected by the coating of glaze subsequently laid over the surface. This mode of application is, however, practicable only when the colours are capable of resisting, unaltered, the temperature to which the ware is exposed during the firing of the glaze. Such is the case, for example, with the cobalt blues and chrome greens. But such colours are exceptional, for in most cases the tint would be seriously altered, if not entirely dispelled, by the high temperature requisite for fusing the porcelain glaze, and such colours can therefore be used only for painting upon the glazed surface; thus some of the yellows from preparations of antimony are rendered almost colourless by a high temperature. Hence the distinction between colours employed *under* the glaze, and those which can be used only *over* the glaze.

Among the metallic oxides which are available in ceramic decoration the following are the most important:—Oxide of *cobalt*, prepared generally from ores containing cobalt and nickel—sulphides, arsenides, and arsenio-sulphides—is extensively used in the preparation of blues, grays, and blacks, these colours

---

\* On the subject of colours and glazes the visitor may be referred to Professor Church's Cantor Lectures on "Some Points of Contact between the Scientific and Artistic Aspects of Pottery and Porcelain." *Journ. Soc. Arts*, vol. xxix., 1881, pp 95, 105.

being capable of withstanding a high temperature, and therefore of being used under the glaze; the purity of tone of the cobalt-blues is greatly affected by the presence of nickel, iron, or manganese. Oxide of *chromium* generally obtained by the decomposition either of chromate or bichromate of potash, or of chromate of mercury, is used for producing a very stable green colour which may be worked under the glaze; chromium is also a constituent of a pink colour used in ceramic decoration. Peroxide of *iron*, or ferric oxide, prepared by the calcination of ferrous sulphate, or green copperas, is used for reds, browns, and violets, the tints varying with the temperature at which the calcination is effected, and being capable of modification by association with other oxides; the bright red of the Kaga ware of Japan illustrates the vivid character of some iron pigments. Oxide of *antimony*, giving various shades of yellow, is generally mixed with oxide of zinc or of iron, but is sometimes used in the form of antimoniate of lead or "Naples yellow." Oxides of *copper* form silicates which are red with the suboxide (cuprous salts), and blue with the protoxide (cuprous salts), when associated with an alkaline silicate. Peroxide of *manganese* occurring abundantly in a native state as pyrolusite, is used for violet, puce, and black; sesquioxide of *uranium*, a rare compound, is occasionally employed for producing an orange colour; while oxide of *iridium*, an expensive preparation, is highly valued for giving a black colour of extraordinary intensity. Oxide of *zinc*, although incapable by itself of imparting colour to any vitreous substance, is nevertheless of great importance by its power of modifying and improving other colours with which it may be associated, such as the cobalt-blues. The tint may often also be affected by the character of the flux employed.

Of the materials used for fluxing, the chief are felspar, borax, nitre, litharge, alkaline carbonates, and preparations of bismuth. It is necessary that the vitreous substances formed by these fluxes, and coloured by the metallic oxides, should expand and contract by alterations of temperature, in the same degree as the body or glaze to which they are applied, since the colours would otherwise become cracked or "crazed."

The collection includes a series of pottery pigments in powder, with slabs of porcelain showing the same colours after firing (D. 1 to 27), prepared and presented many years ago by Messrs. Minton and Co.; a series of 28 small porcelain specimen-slabs, illustrating a great range of tints (D. 28 to 55), also from Messrs. Minton's works; a series of 34 specimens of colours showing each pigment in its raw state, accompanied by a specimen-slab exhibiting the same colour after firing (D. 56 to 89), prepared and presented, from the Exhibition of 1862, by Messrs. Emery and Co., of Cobridge, Staffordshire; 14 specimen-slabs of majolica enamels and glazes (D. 90 to 103), prepared and presented by Messrs. Maw and Co., of the Benthall Works, Broseley; 29 cylindrical vessels of porcelain, each coloured in transverse bands

with different tints of enamel colours (D. 104 to 132); a specimen-slab (D. 133), divided into 20 compartments, showing the principal colours employed at the National Porcelain Manufactory at Sèvres; 15 trial plates, with samples of various colours employed at Sèvres (D. 134 to 148); and 12 porcelain tablets (D. 152 to 163), each divided into three compartments exhibiting 36 of the principal colours employed at the Royal Porcelain Manufactory at Berlin.

One of the most interesting ceramic pigments is the famous *Purple of Cassius*. D. 23 is a bottle with this colour in the moist state, as a precipitate formed by adding a solution of protochloride and perchloride of tin (stannous and stannic chlorides) to a solution of terechloride of gold (auric chloride), or by digesting metallic tin in a solution of gold terechloride. Purple of Cassius forms the base of all the pink and purple colours used for painting over the glaze, but the pinks and purples used under the glaze (D. 14 and D. 16) generally contain the oxides of chromium and tin.

A small series, presented by Messrs. Minton & Co., illustrates the materials employed in gilding on porcelain. The preparation, as used, is shown in the bottle D. 164. An amalgam of gold and mercury is mixed with a flux, and the powder worked up with turpentine and oil, so that it may be applied to the ware by means of a camel-hair pencil. The design having been traced with this preparation, the piece is placed in a muffle and submitted to firing. The gold left on the surface by the evaporation of the vehicle is at first "dead," but readily assumes its metallic lustre by burnishing with a piece of agate or hæmatite. The slab D. 165 shows the gold after burnishing. The rich effect of raised gold, as seen on the slab D. 167, is economically obtained by first tracing the design with thick yellow enamel, the surface of which is then gilt.

### *Lustres.*

[See specimens in Wall Cases XL and XLI.; lower compartment, top shelf.]

Common pottery is often decorated with a brilliant metallic lustre, which in some cases results from an extremely thin film of the metal upon the glazed surface. As the metals thus employed must not be susceptible of alteration by the agents to which pottery is commonly exposed, recourse is usually had to the precious metals, chiefly gold and platinum, but the quantity used is so extremely small that the commonest forms of earthenware may be coated with these lustres. Different processes are followed in the preparation of lustres, but they all consist in reducing the metal from a state of combination, and depositing it in such a form that it exhibits its characteristic lustre *without burnishing*. The gold is dissolved in aqua regia, tin is frequently added, and the preparation mixed generally with balsam of

sulphur and oil of turpentine. This preparation having been applied to the surface by means of a brush, the piece is carefully fired and the reduced metal deposited in a state of extreme tenuity; indeed, the layer is often transparent, and hence the colour may be modified by that of the subjacent surface.'

It appears that the earliest known lustred pottery is that found on the ruins of Rhages and other ancient cities in Persia, some of which, according to Sir R. Murdoch Smith, may be 2,000 years old. A knowledge of lustres was probably brought to Europe by the Arabs, and some of the oldest European examples are from Spain. Two specimens of coarse Hispano-Arabic ware, of late date, are exhibited as D. 168 and 169.

It has been supposed that the lustres on some of the old Spanish ware are due to a very thin layer of some preparation of copper and not to the metal itself. It is notable that a brilliant lustre similar to that on the Spanish ware was used in the last century at Brislington, near Bristol. (*See* p. 139.)

The employment of lustres in the decoration of Majolica ware has been already referred to (p. 51). It is generally said that their use was introduced into Italy by the Moors, and that the art of producing the *madreperla* and ruby lustres was first practised at Pesaro towards the close of the 14th century. Notwithstanding the beauty of these lustres, their employment on majolica ware does not seem to have extended beyond a period of about 60 years, and the art of lustre-decoration came gradually to be lost. After a disappearance of three centuries, the art was revived at Doccia and Gubbio.

Of late years Mr. William de Morgan, of Chelsea, has most successfully turned his attention to the production of lustres, especially of copper and silver, and has obtained great proficiency in their application to ceramic decoration. Writing in 1892,\* he thus describes his process, as then practised at Fulham:—  
 “ The pigment consists simply of white clay, mixed with copper-  
 “ scale or oxide of silver, in proportions varying according to  
 “ the strength of colour we desire to get. It is painted on the  
 “ already fused glaze with water and enough gum arabic to  
 “ harden it for handling and make it work easily. . . . The  
 “ ware, when painted, is packed in a close muffle, which is then  
 “ raised to a very low red heat, so low, when the ordinary tin  
 “ enamels are employed, as to be only just visible. A charge  
 “ of dry wood, sawdust, wood chips, or, indeed, any combustible  
 “ free from sulphur, is then introduced into the muffle through  
 “ an opening level with the floor, a space having been left clear  
 “ under the ware for its reception. As soon as it has blazed  
 “ well up, the opening is closed. The flare then chokes down,  
 “ and the combustion of the charge is retarded, the atmosphere  
 “ in the muffle consisting entirely of reducing smoke.”

---

\* “Lustre Ware.” By William de Morgan, *Journ. Soc. Arts*, vol. xl., 1892, 756.



Several examples of lustres on common ware of the Staffordshire potteries are exhibited. The use of lustre pigments was successfully carried on many years ago by Messrs. Lockett & Co., of Longton. Samples of common ware daubed over with a purple metallic lustre will be found among the productions of the Newcastle and Sunderland potteries. Lustre pigments have also been used at Swansea. In recent years, lustre decoration has been most successfully employed by Messrs. Maw, of Broseley, Salop.

A beautiful pearly lustre, like that of mother-of-pearl, is exhibited on some cups and saucers (D. 177 to 182), made by Messrs. Gillett and Brianchon, of Paris, and exhibited at the International Exhibition of 1862. This peculiar nacreous lustre is produced by the use of nitrate of bismuth as a flux, mixed with resin and essence of lavender as a vehicle, and associated with certain metallic oxides as colouring agents. A similar lustre has been used on Worcester and Belleek china. (*See* p. 175.)

---

#### ANCIENT BRITISH POTTERY.

In describing the various kinds of pottery found in this country it is necessary to allude in the first place to those primitive wares which, being of pre-Roman age, are generally known as Ancient British pottery. Much of this early ware is found under conditions which show that it was contemporaneous with the use of stone and bronze implements in these islands; but it is probable that similar coarse pottery continued to be made even subsequently to the period of the Roman conquest. The paste of this pottery consists of coarse unprepared clay, usually mixed with pebbles; and in most cases it has been but imperfectly baked. The vessels vary considerably in size and form; most of them were simply fashioned by hand, and are therefore as irregular in outline as they are rude in ornamentation. The larger vessels are commonly urn-shaped, with a wide mouth, narrow base, and overhanging rim. In decoration they exhibit great simplicity; the common ornaments having been often produced by means of cords, bands, or thongs twisted round the vessel when yet moist; in other cases they consist of zig-zag, chevron, or herring-bone patterns, either scratched in the paste with a sharp-pointed instrument or impressed by means of a rude stamp. It was probably to some of these vessels that the Romans applied the term *bascandæ* or baskets. Most of the samples of such ware which have come down to us appear to have been used for sepulchral rather than for domestic purposes. Indeed, this early pottery is chiefly found in barrows or tumuli, where it is frequently associated with implements of polished stone and bronze, and with beads of glass, amber, and jet. The late Mr. Bateman, who had great experience in opening burial mounds in Derbyshire, proposed to classify this pre-historic

pottery in the four following groups: \* *Cinerary or sepulchral urns*, which are found either containing calcined human bones or inverted over them; *Incense-cups*, which are smaller vessels, of doubtful use; *Food vessels*, supposed to have contained offerings of food to the departed; and, finally, *Drinking cups*. Such a classification, however, is far from satisfactory, and our knowledge of the uses of many of these vessels is still very imperfect. The so-called incense-cups were termed by the late Mr. Llewellyn Jewitt *immolation-urns*.

There are at present only two examples of ancient British pottery in this collection. A very fine series, however, will be found in the British Museum, including the collection formed by Canon Greenwell, and described in his work on British Barrows.†

The specimen exhibited in Pedestal Case No. 2, under the reference D\* 1, is a small but elegant cinerary urn, presented by Kenneth R. Murchison, Esq., and found on the late Sir Roderick Murchison's ancestral estate at Tarradale, in Ross-shire, Scotland.

Mr. Arthur J. Evans has recently described some interesting types of pottery from an urn-field at Aylesford, in Kent, referred to about the middle of the first century B.C. These Late Celtic vases are of light body, made on the wheel, and of elegant form, offering a marked contrast to the rude indigenous pottery of the pre-Roman barrows of Britain.‡

---

### ROMAN POTTERY.

[See specimens in Pedestal Case No. 2; west side.]

#### *Roman Red Lustrous Ware (Samian).*

The use of this kind of pottery appears to have extended with the Roman empire, fragments having been discovered wherever the Roman people had settled after their conquests. The date of its manufacture probably extended from the first century B.C. to the fourth century of our era. It seems to have been employed for domestic purposes, as earthenware and porcelain now are in this country. Passages from classical writers may be cited to show that at certain periods it was fashionable at Roman tables, but at other times it fell into disfavour, and its use became almost a reproach. Samian ware was also employed for vessels used in certain religious ceremonies.

The paste of the ware is usually of a fine sealing-wax red colour, and was well worked before being wrought into shape. Vessels of this ware have been generally carefully manufactured, the plain pieces bearing the marks of having been turned on the lathe, while the pieces which are moulded outside are in like manner carefully finished inside. The red colour is derived

---

\* "Ten Years' Diggings in Celtic and Saxon Grave Hills." London, 1861. Mr. Bateman's fine collection is now exhibited in the Sheffield Museum.

† "British Barrows." By the Rev. W. Greenwell and George Rolleston. 1877.

‡ *Archæologia*, second series, vol. ii., 1890, p. 315.

from the presence of peroxide of iron (ferric oxide), which is supposed to have been purposely introduced into the paste by admixture of certain ochres with the levigated clay. The glaze is generally brilliant, unless it has been decomposed from having been subjected to unfavourable conditions when buried in the earth, and appears to have been formed of a silicate with an alkaline-earthly base, coloured by peroxide of iron. The glazing on certain specimens suggests that the vessels, in an unglazed condition, were dipped into a liquid slip containing the materials which, on firing, would vitrify and form the glaze. The late Dr. Birch suggested that a salt glaze might have been used. Some of the ware seems to be polished rather than glazed. A piece of Roman red ware found at Châtelet, and analysed by M. Salvétat, presented the following composition:—

Silica	-	-	-	-	-	64·00
Alumina	-	-	-	-	-	17·77
Oxide of iron	-	-	-	-	-	10·23
Lime	-	-	-	-	-	4·86
Water	-	-	-	-	-	2·29
						<hr/> 99·15 <hr/>

The following analyses of two fragments of this ware found in London were made at the Museum of Practical Geology by the late Messrs. Philipps and Smith under the direction of Dr. Percy, F.R.S. :—

—	I.	II.
Silica - - - - -	54·45	60·67
Alumina - - - - -	22·08	20·96
Peroxide of iron - - - - -	7·31	5·95
Lime - - - - -	9·76	6·77
Magnesia - - - - -	1·67	1·22
Potash - - - - -	3·22	Alkalies in small quantities.
Soda - - - - -	1·76	
<hr/> 100·25 <hr/>		<hr/> 95·57 <hr/>

Respecting this ware, M. Brongniart observes “that it was “worked in the most perfect manner, and with the aid of the “greater part of the processes and means now employed in the “most perfect manufacture.”\* The moulding seems to have been so conducted that, with numerous stamps of different kinds, a great variety of patterns could be produced. These stamps appear to have been impressed upon a general mould, into which the moist paste was pressed, the mould being often formed of the same paste as the ware itself, and baked prior to use.† In consequence of shrinkage, after drying and firing, the finished

\* “Traité des Arts Céramiques,” tome i., p. 423.

† A fine mould for a Roman bowl will be found among the specimens from the Rhine (No. E. 241).

piece of ware would be smaller than the baked mould. If the latter were turned inside, when in the state of paste and before receiving the impressions from the stamps, as probably it was, the marks of the turning on a lathe would be impressed on the outer surface of the piece of ware enclosed; and thus an explanation would be offered of the difficulty which is suggested in attempting to account for the way in which the marks from the lathe are sometimes singularly associated with the raised figures of the pattern. The moist paste of the ware inside, in the general mould, could readily be turned after it had been pressed properly against the latter, so that the fine work on the exterior need not have been handled after pressure into the general mould, and the finishing completed by the lathe inside and around the edges. Indeed, if the general mould were whole and employed as a sagger, the interior vessel in its state of paste, after drying and shrinking, might have been fired in it.

It has generally been considered doubtful whether this red lustrous ware was manufactured in the British Islands, though its remains are sufficiently common, especially at Roman stations in the south and west of England. It appears to have been largely imported during the Roman occupation of these countries, and, judging from the mended specimens, often discovered, seems to have been of fair value at the time; much in the same way that Chinese porcelain was prized before porcelain was made in this country. The late Mr. Roach Smith held that all the Samian ware found in Britain was of foreign origin; but the discovery of a portion of a mould for a bowl during excavations at York in 1874, supports the view that such ware was also manufactured to some extent at the Roman stations in this country. Most of it, however, was probably made in Gaul.

The ware is usually known to antiquaries as "Samian," from Samos having been celebrated for its manufacture of a red pottery. The Samian potters were famous about B.C. 900; but it may be doubted if any vessels of their manufacture have ever been found at the Roman stations in England.\* This so-called Samian ware appears to have been manufactured extensively in Italy, Gaul, and Germany; while a somewhat similar material known as "Aretine ware" was made at Aretium, the modern Arezzo, in Italy. Various instruments in bronze, copper, ivory, or bone, probably used in the manufacture and ornamentation of the pottery, have been found where kilns for firing this ware have been discovered. Moulds also, and stamps for making them, have in like manner been obtained in certain localities where it was manufactured, as at Rheinzabern, Lezouk, Arezzo, and elsewhere. Though all this ware does not exhibit the potters' marks, a large proportion of it is found to be carefully

---

\* On the application of the term Samian to the Roman red lustrous ware found in England, *see* discussion by Gen. Pitt-Rivers in his "Excavations in Cranborne Chase" (Printed Privately), vol. iii., 1892, p. 294.

stamped with such marks. Sometimes the name is in the nominative followed by F. (*fecit*), as for example, MONTANS·F., showing that *Montanus* made it; in other cases the name is in the genitive succeeded by M. (*manu*), such as CRISPINI·M., signifying that the object was the work of *Crispinus*; while the abbreviation O. or OF. or OFFI. (*officinā*) points to the manufactory of some potter, or at some place named in the inscription. According to Brongniart, some pieces of this ware have been found with marks engraved with a point after baking, and he observes that though in the Roman potteries found in France the potters' names are chiefly Latin, there are, nevertheless, many Gaulish names, such as *Diveæ*, *Vekivix*, *Buturix*, &c.

### *Roman Red Lustrous Ware found in London.*

The following section (Fig. 25) exposed while the improvements were in progress in Cannon Street, City, in 1851, was recorded by the late Mr. Chaffers, and will serve to illustrate the manner and relative position in which this ware is usually discovered in the City of London.

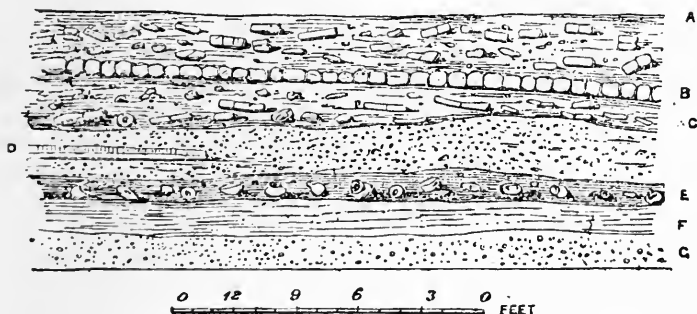


FIG. 25.

A, present level of the street. B, roadway previous to the Great Fire of London, 1666. C, ground in which the Norman and Early English pottery is found. D, portion of Roman tessellated pavement. E, black soil, in which the Samian and other Roman ware is found. F, clay, resting on G, gravel.

A large number of the specimens collected in Pedestal Case No. 2, were obtained from the Chaffers Collection, and include illustrations of all the chief types of Samian ware. Other collections will be found in the British Museum, and in the Museum of the Corporation at Guildhall. In whatever part of the City of London deep excavations are made this ware is almost certain to be found. An extraordinary collection of Roman relics, including some very fine specimens of Samian pottery, was unearthed in 1872, during the excavations for cellars on the premises of the National Safe Deposit Company in Walbrook.\*

\* This collection was described by the late Mr. J. E. Price, F.S.A., in a work entitled "Roman Antiquities illustrated by Remains recently discovered on the site " of the National Safe Deposit Company's premises, Mansion House, London." 4to London, 1873.

Among the finer specimens in this museum may be mentioned the elegant vase, or bowl, E. 1 (Fig. 26), bearing the potter's mark OF · VITAL (*Officinā Vitalis*). This piece was found in St. Martin's-le-Grand, London, in August 1845.

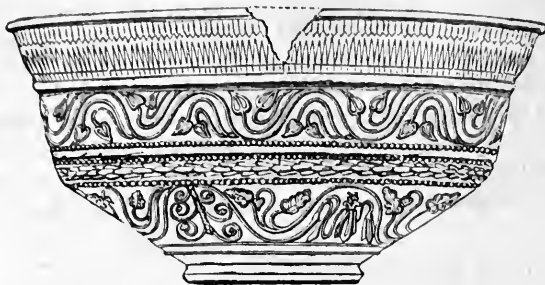


FIG. 26.

Of somewhat similar character is the bowl, or *paropsis*,\* E. 2 (Fig. 27), stamped with the potter's mark OF · RVFINI.



FIG. 27.

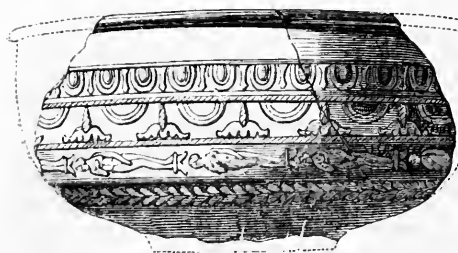


FIG. 28.

The fragment of a vase, E. 5 (Fig. 28), found at St. Mary-at-Hill, London, in July 1845, is noteworthy, inasmuch as the ornamentation includes a border of horizontal figures representing the Venus de' Medici.

The specimens succeeding E. 6 are placed, with few exceptions, in the lower compartment of the case. Several of these specimens, such as E. 14 to 16, have been mended by means of lead in much the same manner as porcelain is now sometimes repaired with metallic rivets. They show the esteem in which the red ware was held in this country during the Roman

\* On the terminology, see a paper "On vessels of Samian ware," by H. Syer Cumming, Esq., *Journ. Brit. Arch. Assoc.*, Dec. 1891, p. 277.

occupation, and also recall the fragile character of Samian ware, a character to which allusion has been made by classical authors.\*

Fig. 29 represents an elegant little *acetabulum*, or vinegar cup, E. 17; while Fig. 30 depicts a fragment of a vessel of rather exceptional form.



FIG. 29.



FIG. 30.

The *mortarium*, F. 30 (Fig. 31), having the border ornamented with a mask, bears the potter's mark VLI GGI · M. The *mortarium*, in which substances were ground for domestic use, was lined inside up to a certain height with grains of quartz or other hard stone, forced into the paste or body after the piece was finished. The substances having been ground or pounded, and probably mixed with some liquid, were poured out through the orifice in the mouth of the mask.



FIG. 31.

The elegant little cup, E. 19 (Fig. 32), found in 1841 at the terminus of the Greenwich Railway, has the potter's mark stamped on a footprint (Fig. 33). The print of the human foot, not uncommon on the pottery of *Aretium* (modern *Arezzo*), probably had reference to the use of the foot in treading the clay.

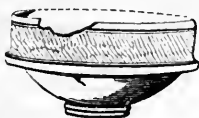


FIG. 32.



FIG. 33.

The inscription MICCIO (Fig. 34) occurs on a fragment of Samian ware, E. 34, which was found in Creed Lane; whilst that of AISTIVI · M (Fig. 35) is found on another specimen from the same locality. The mark CELSINVS · F (Fig. 36) is on a flat *catinus*, E. 38, found in 1845 in Staining Lane, London.



FIG. 34.

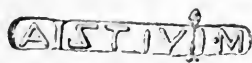


FIG. 35.



FIG. 36.

\* Thus, Plautus, in his play of *Menachmus* (Act 1, sc. 2), makes one of the characters bid another knock gently at the door, whereupon comes the reply, "I think you are afraid the doors are made of Samian ware."

"M. Placide pulta. P. Metuis, credo, ne fores Samiae sint."

*Red Lustrous Ware found chiefly at Castor and at Colchester.*

FIG. 37.

Some fine pieces of Samian ware, from various Roman stations in England, are exhibited in the upper part of the Pedestal Case No. 2. The large fragment of a vase, E. 39, is handsomely decorated with moulded figures, as shown in Fig. 37. A crack in this piece shows the way in which it has been united in two places by lead rivets, in the time of the Roman occupation of England. It was found at Castor (the ancient *Durobrivæ*), near Peterborough, Northamptonshire, and was presented to the Museum, with many others, by Earl Fitzwilliam. The next piece, E. 40, from the same locality and presented by the same donor, is ornamented as



FIG. 38.

shown in Fig. 38. This likewise shows ancient lead rivetting, while the specimen E. 41 has been so prized as to be repaired in two places. A high value must evidently have been set on favourite pieces of Samian ware; and one specimen discovered near the Mansion House in London, was described by the late Mr. J. E. Price as having the rivet "worked over upon its inner surface" "with a metallic substance which gives it an appearance similar" "to our electro-gilding."\*

*Other kinds of Roman Pottery found in England.*

[Placed in upper compartment of Case 2.]

Whatever doubts may exist as to the Romano-British manufacture of Samian ware, there can be no question that coarser kinds of pottery were produced on a large scale in this country during the Roman occupation. Two Roman kilns for firing pottery, discovered by the late Mr. Artis in Normangate Field, Castor, near Peterborough—the *Durobrivæ* of Antoninus—are represented by models presented by Earl Fitzwilliam, and are here figured. Fig. 39 is a reduction of the representation of the kiln given by Mr. Artis, in his *Durobrivæ of Antoninus Illustrated*, pl. XL, fig. 3. The kiln was discovered in December 1822, and vessels and fragments of pottery were found in connexion with this and the other kiln, many of which are in this collection. Fig. 40 is taken from pl. XL, fig. 1 of the same

\* "Roman Antiquities." 1873. p. 57.



work. In pl. XXXIX. of Artis's *Durobrivæ* will be found a plan of the ground occupied by the Roman pottery, showing the site of the works and the course of a Roman road. Both these wax models were constructed by Mr. Artis.

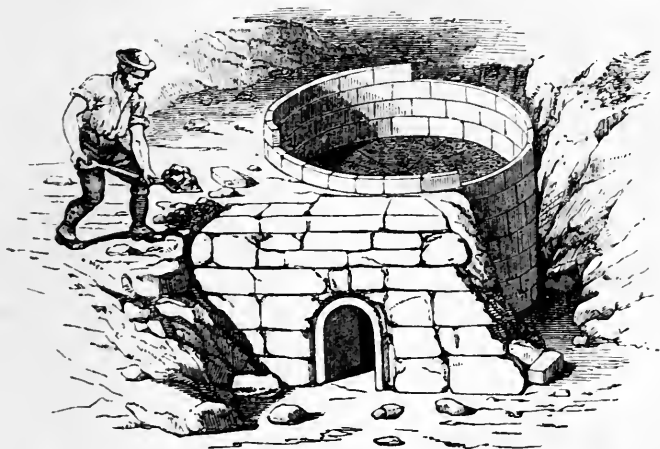


FIG. 39.



FIG. 40.

A number of tools and ornaments, in bone or ivory and bronze, discovered on the site of the Castor pottery, will be found by the side of the models. There is also a large fragment of a cake of frit or glass, E. 86 (Fig. 41), which having been found at the old pottery, probably represents the material used there for glazing the ware.



FIG. 41.

The composition of this substance, according to an analysis made at the Museum of Practical Geology, is as follows:—

Silica	-	-	-	-	-	69.40
Alumina	-	-	-	-	-	2.62
Protoxide of iron	-	-	-	-	-	0.91
Protoxide of manganese	-	-	-	-	-	0.64
Magnesia	-	-	-	-	-	0.79
Lime	-	-	-	-	-	7.81
Potash	-	-	-	-	-	0.98
Soda	-	-	-	-	-	14.63
Carbonic acid	-	-	-	-	-	0.32

98.10

It is thus a glass composed essentially of the silicates of soda and lime, and having a composition similar to that of much of the ancient Roman glass.

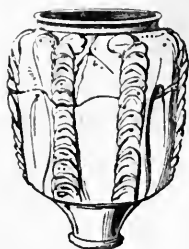


FIG. 42.

This piece is figured in Artis's *Durobrivæ*, pl. LIII., Fig. 1.

A fine collection of *Castor ware*, the gift of Earl Fitzwilliam, is here exhibited. Fig. 42 represents a specimen, E. 88, found in one of the kilns. The paste is yellowish brown, with a reddish-brown glaze, having a slightly metallic lustre. The sides are impressed in six compartments, with the intervening ridges ornamented with imbricated scales, apparently made by overlapping cut pieces of the clay.

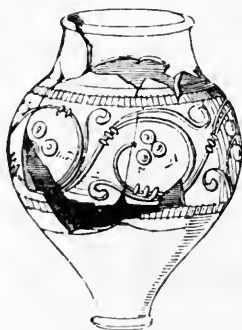


FIG. 43.

The vase E. 89 was found in a Roman building near Water Newton, Northamptonshire, in February 1826.

The paste is yellowish brown, with black glaze, and the vase is ornamented with elegant engobe scroll applied in white pipeclay as seen in Fig. 43. Tool marks made before glazing appear above and beneath the scroll. This vase is figured in Artis's *Durobrivæ*, pl. XLI., Fig. 1.



FIG. 44.

The vase E. 90 has a yellowish white body with stronger yellow on the exterior, and is painted with black as represented in Fig. 44. This also is figured in Artis's *Durobrivæ*, pl. XLVII., Fig. 1.



FIG. 45.

The small vase E. 91 (Fig. 45), depicted in Artis's *Durobrivæ*, pl. LI., is in light brown unglazed ware. E. 92 (Fig. 46) is a small vase in white ware, with red glaze, which was found in a Roman kiln at Castor, and appears in Artis's *Durobrivæ* as Fig. 1., pl. LIV.



FIG. 46.

Fig. 47 represents a vase of dark-coloured ware, E. 93, apparently made from a carbonaceous clay not highly fired. The pattern is

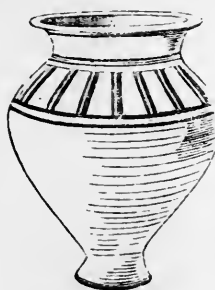


FIG. 47.

produced partly by glossy lines upon a dull ground, as if from smoothing pressure by a tool, and partly by bands from turning in a lathe. It was found in February 1826, in a Roman build-



FIG. 48.

FIG. 49.

FIG. 50.

ing at Water Newton, Northamptonshire, and has been figured in Artis's *Durobrivæ*, pl. LI, Fig. 2.

Several *unguentaria* in Castor ware are here exhibited, of which Figs. 48, 49, and 50 represent respectively the pieces marked E. 96, E. 97, and E. 100.

Many other specimens of Roman pottery found at Castor, and no doubt of local manufacture, are exhibited in the lower part of this case. These formed part of the Artis collection, and are marked E. 137 to E. 177, all having been presented many years ago by Earl Fitzwilliam.



FIG. 51.



FIG. 52.



FIG. 53.



FIG. 54.



FIG. 55.



FIG. 56.

Much of the Castor ware is thin and well-potted, and decorated with graceful patterns laid on in white clay-slip, or *engobe*. Figs. 51, 52, 53, 54, 55, and 56 (representing fragments exhibited in the Museum as E. 140, 152, 155, 156, 163, and 166 respectively) illustrate the characteristic ornamentation of this pottery, and give an excellent idea not only of the elegant scroll-work, but also of the hunting scenes which are figured in low relief upon much of this ware. The vase E. 102



FIG. 58.

(Fig. 57) though found at Winchester is probably a piece of Castor pottery; as also is the vase E. 109 (Fig. 58) which was found, in 1845, at Cateaton Street, London. The latter offers, in its representation of a stag hunt, another illustration of the Roman love of the chase.



FIG. 57.

Examples of Roman pottery made in the *New Forest* are furnished by the specimens E. 130 to 134, which were found at Crockle, near Wellow, and were presented in 1863 by Mr. J. R. Wise. Some of these show a characteristic purplish glaze, with slightly metallic lustre. The sides are marked by indentations which appear to have been made by pressure of the thumb, and in No. E. 132 they are so deep as almost to meet inside the vessel. The character of these indentations is shown in Fig. 59, which represents a vase, E. 129, found in Lothbury, in 1847, but probably of New Forest origin.

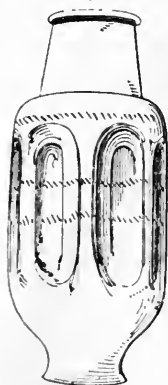


FIG. 59.

Many interesting examples of Romano-British pottery have been found by General Pitt-Rivers in his excavations in Cranborne Chase.

It is well known that the so-called marshes at the mouth of the Medway, especially in the neighbourhood of the village of Upchurch, were the site of extensive potteries during the Roman occupation of Britain. A layer of pottery, in some places a foot in thickness, may be traced over a considerable area, and although this pottery is for the most part in mere fragments, yet associated with these are occasionally found well-preserved vessels, several examples of which are in this collection. The Romano-British pottery of Upchurch has a character of its own by which it may be traced over many parts of Britain and even on the Continent. It appears to have been made of local clays, and presents usually a bluish black colour, a colour which is generally attributed to

the ware having been fired in "smother-kilns," where the reducing action of the smoke and hydro-carbon vapours would tend to prevent the iron in the clay passing into the state of peroxide, to which the red colour of pottery is generally due. Whilst the forms of the Upchurch pottery are by no means inelegant, the ware was evidently intended for useful rather than for ornamental purposes, and it consequently presents little or no ornamentation. Such ornament as it does present consists either of incised lines, straight, wavy, or zigzag; or of raised bosses and studs, grouped in bands or circles. This ware never bears any potter's marks.

A large collection of Upchurch pottery was presented to the Museum, in 1871, by Mr. J. Chisholm Gooden, and is exhibited in the lower compartments of two cases in the Vitreous Series, opposite to the Pedestal Case No. 2. This collection includes specimens marked E. 197 to E. 232. There are also many pieces, assignable to Upchurch, which have been found in London and at various provincial Roman stations, and are consequently exhibited in other sections of the Museum. Probably the vase, E. 108 (Fig. 60), which was unearthed in Queen Street, Cheapside, in 1850, may be attributed to the Medway potteries.

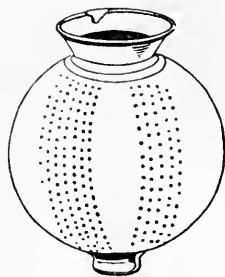


FIG. 60.

Romano-British pottery was also made at several other localities in Britain; but probably these potteries were of less importance than those already mentioned. Many of the specimens discovered in London are not readily referred to their place of manufacture. Remains of kilns have been found in the city, close to St. Paul's. The large *amphora* E. 111, represented in Fig. 61, is of light-brown unglazed ware, 2 feet 9 inches in height, and was found in Aldermanbury. On account of its unusually large size, it could not be exhibited in the case, and is therefore mounted on a tripod which stands on the top of Pedestal Case No. 2.



FIG. 61.

A smaller amphora of similar ware, E. 112 (Fig. 62), found in digging the foundation of London Bridge, is placed on a tripod in Case No. 2, where also will be found other amphoræ of rather different ware. The specimen, E. 113 (Fig. 63), of red unglazed pottery was brought to light during some excavations in Old Broad Street, in August 1850; whilst the rather curiously-shaped vessel, E. 115 (Fig. 64), was unearthed in Cannon Street. The flattened amphora, E. 116 (Fig. 65), resembling a pilgrim's bottle, was found in Moorgate Street, in 1835. Some of the amphoræ are pointed at the base, and were evidently intended to

be supported on stands or to be fixed in soft earth. They were used for holding wine, oil, &c., and specimens have been found, stuck in the ground, in an upright position.

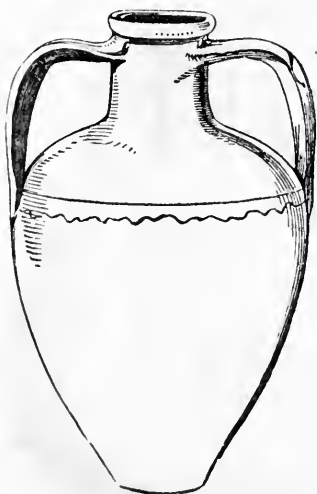


FIG. 62.



FIG. 64.

Among other interesting specimens of Romano-British pottery found in London may be mentioned the *mortarium*, E. 117 (Fig. 66), in rather coarse unglazed buff ware, stamped on the

rim with the potter's mark ALBINVS. This piece was found in April 1844, in some excavations in Cock Lane, Smithfield.

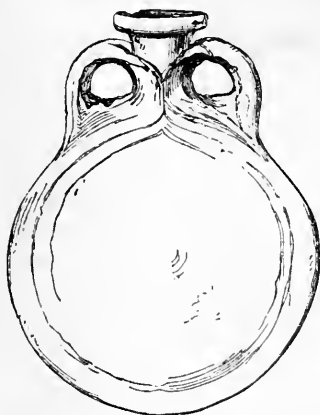


FIG. 65.

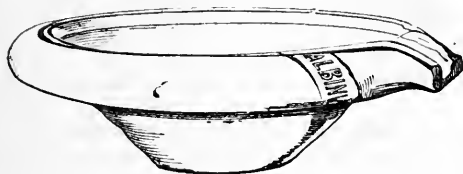


FIG. 66.

Several Roman *lamps* are exhibited, of which three specimens, E. 118, 119, and 120, are figured respectively as Figs. 67, 68, and 69. There are also some curious terra-cotta *toys*. E. 123 (Fig. 70), representing a boy on horseback, was found in 1840 in the Borough (Southwark) on the Surrey side of London.



FIG. 67.



FIG. 68.



FIG. 69.



FIG. 70.

A few interesting specimens of *Roman bricks and tiles* are provisionally placed on a plinth at the foot of the balustrade, near to Pedestal Case No. 55, on the eastern side of the Museum.

The red brick or flange tile, E. 233 (Fig. 71), found in Queen Street, in the City, in March 1850, bears the stamp P·PR·BR; whilst the next specimen (E. 234), also found in London, is inscribed P·BR·LON. The inscriptions on these tiles have been variously read. The "LON" certainly refers to London, but the "BR" may mean either the Province of Britain or the auxiliary troops called Brittones. Thus the inscription on E. 234 may be read either *Proprietor BRITANNI LONDINII* or *Prima (cohors) Brittonum LONDINII*. In like manner the inscription on E. 233 may mean either *Proprietor Provinciae BRITANI*, or *Praefectus PRIME (cohortis) BRITTONUM*. The possible meanings of such inscriptions have been discussed by the late Mr. C. Roach Smith, Mr. T. Wright, and Mr. J. E. Price.



FIG. 71.

Some Roman roofing tiles, found in London, are exhibited under the reference numbers E. 238*a*, 238*b*, and 238*c*. The tile 238*a* is the *imbrex* or semi-circular ridge-tile which rests upon the *tegulae b* and *c*, or flat tiles, each with two flanges, so that the ridge tiles cover them in such a manner as to prevent the water passing beneath. The ridge-tile is wider at one end than at the other, in order that it may cover the next tile in succession under it, thus forming a ridge down the roof.

The hollow flue-brick E. 239 (Fig. 72) was found, in August 1846, during excavations in Ducksfoot Lane, London. Such hollow tiles were used by the Romans to convey heated air from the hypocausts. The upper and lower parts of the specimen are scored with waved and diagonal lines to secure adhesion of the cement or mortar.



FIG. 72.



*Roman Pottery from the Rhine for Comparison with that found in England.*

(Upper compartment of Case 2.)

As water-carriage down the Rhine would have afforded easy means of establishing with Britain a trade in the pottery which was made at several important stations on that river, it has been thought desirable to obtain some illustrative specimens of Roman pottery from the Rhine for comparison with similar ware discovered in Britain. Those selected for this object were chiefly obtained many years ago from the collection of M. Levens, of Cologne, and it is said that they were discovered in that city or in its vicinity; but even should they not all have been found there, yet, coming certainly from the Rhenish districts, they are important for the purpose contemplated. They serve as excellent illustrative examples of the pottery manufactured on the north of the Alps. Cologne (*Colonia Agrippina*) became a large and flourishing place after A.D. 51, when the Emperor Claudius planted a colony there, naming it after his wife, whose birthplace it was.\* Hence the pottery either made or used there is valuable for comparison, particularly when we consider the facility of water-carriage to and from that station. By means of the Rhine and Moselle, trade in pottery could easily have been carried on with Trèves or Trier (*Augusta Trevirorum*), once the capital of the Roman empire, while the mouths of the Rhine would afford ready means of communication with Britain. It is highly probable that red lustrous Roman ware of Rhenish manufacture† was introduced into Britain, and it is certain that at a later date much pottery came over from the Rhine country.

The "Samian" bowl E. 242 (Fig. 73), found at Cologne, is specially noteworthy for sake of its perfect condition. The embossed design includes the representation of a soldier in armour, with sword and shield, engaged in combat with a retiarius, holding on his left arm a net



FIG. 73.

\* This locality was first used as a Roman camp. It became the chief town of the Ubii (*Oppidum* or *Civitas Ubiorum*) after that tribe was removed thither from the right bank of the Rhine under Tiberius.

† This ware was certainly manufactured at Heiligenberg, about five leagues from Strasburg, where some of it was found in a Roman pottery kiln. The remains of Roman pottery kilns have been found in several localities near the Rhine, as at Rheinabern (*Taberna Rheni*), four leagues from Lauterberg, where fifteen kilns were discovered within a small area; Ittenweiler, four leagues from Heiligenberg, &c.

with a sword, and in his right hand a three-pronged spear; also a draped figure presenting a palm branch to an emperor seated on a curule chair.

The rare specimen E. 241 is interesting as being an example of a mould for a Roman "Samian" bowl. It is made of buff-coloured ware, and is impressed on the inside with festoon-and-tassel border and with figures of a Roman warrior, two soldiers in conflict, and an equestrian soldier, with rabbits, dogs, &c. below; stamped in the side with the potter's mark, COBNERTVS · F.

A fragment of a mould for a Roman bowl, with impressed ornaments similar to those found on Samian ware, was brought to light during excavations in 1874, outside the city of York, and is preserved in the museum of the Yorkshire Philosophical Society. A plaster cast of this interesting specimen presented by the Society, through Canon Raine, is here exhibited, for comparison with the Rhenish specimen.

The two-handled cup or vase, E. 253 (Fig. 74), represents a type of vessel which does not appear to have been hitherto discovered in Britain. A Roman red ware vase of similar form, and with raised engobe or barbotine ornaments, found on the site of a pottery at Rheinzabern in 1804, and now in the museum at Sèvres, is figured by Brongniart and Riocreux in their *Desc. Meth. du Musée Céramique de Sèvres*, pl. IX., Fig. 10.



FIG. 74.



FIG. 75.

A perfect patera, E. 244 (Fig. 75), bearing the potter's mark VRSVLVS, may be compared with the fragments Nos. E. 24, 25, and 26, found in London, when it will be observed that the ware, manufacture, and style of ornamentation are similar. A patera of precisely the same kind, found at the Palace of the Luxembourg, Paris, where moulds for the manufacture of ornamented red Roman ware were discovered, is figured in the *Desc.*

*Meth. du Musée Céramique de Sèvres*, pl. IX., Figs. 15a and b.

The vase E. 252 (Fig. 76) admits of comparison with the Castor vase E. 88, on which there are somewhat similar imbricated scales. Still closer is the similarity between the vase E. 259 (Fig. 77) with slip ornament representing

hounds chasing a deer and a hare, and the pieces of Castor pottery E. 152, 163, &c.,

which are decorated with similar designs. This kind of ware may have been manufactured by the Romans in many localities north of the Alps. A fragment representing a hunting scene, from the remains of a

Roman pottery at Rheinzaubern (*Taberna Rheni*), is figured by Brongniart in his *Traité des Arts Céramiques*, pl. XXIX., Fig. 1.

These hunting scenes are rendered with much spirit and fidelity, although the animals are simply represented by slip trailed over the surface of the ware.

In like manner the vase E. 261 (Fig. 78) is ornamented with bosses in slip, or barbotine, similar to the dotted designs on certain fragments of ware found at Castor, such as the specimens designated E. 158 and 159.



Fig. 76.



Fig. 77.



Fig. 78.

The small vase, E. 255, from the Cato collection is notable in that it bears around the body an inscription in white engobe V · I · T · A ·. The character of the inscriptions on cups of this ware, such of *Vita, Vinum, Bibe, Reple, Amo, Ave, Felix, &c.*, shows that the vessels were used for convivial purposes.

An interesting specimen, E. 262, is represented in Fig. 79. This is a lamp furnished with eight nozzles, or burners, and



Fig. 79.

with loops for suspension.

*Aretine Ware.*

Aretium, the modern Arezzo, in Tuscany, was famous for its pottery. Pliny speaks of Aretine ware as being of a superior kind (*Nat. Hist., Lib. xxxv., cap. 12*). Dr. Fabroni, in his *Storia degli Antichi Vasi fittili Aretini* (Arezzo, 1841), refers to the various ancient and modern authors who have mentioned the ware, and gives illustrations justifying the high character assigned to it. As a characteristic specimen of this fine pottery, the hemispherical cup E. 264 is exhibited. Figures 80 and 81 represent this specimen, and illustrate the higher style of art which was employed, in Roman Italy, in the decoration of such ware. The bowl was obtained from Arezzo.



FIG. 80.



FIG. 81.

## ANGLO-SAXON POTTERY.

It appears that after the Romans quitted Britain towards the middle of the fifth century, the pottery which they left behind continued in use among the inhabitants of the country: such, at least, may be inferred from the occurrence of fragments of Roman pottery, including the red lustrous ware, in graves considered to be of early Anglo-Saxon date. There may indeed be some difficulty concerning that kind of pottery which was certainly manufactured by the Romans in Britain, since it may fairly be supposed that potteries would be continued for a time at many of the former Roman sites, and that the forms given to the ware would also for a while be somewhat similar. With the vessels of the red lustrous ware, however, the evidence is more definite, since there is little reason to suppose that this ware was largely manufactured in Britain. Even during the Roman occupation, it was of sufficient value to be mended by rivetting, as testified by many specimens in this collection, described in the previous pages. The manufacture of even the coarser kinds of Romano-British pottery was probably abandoned before the period of the Saxon conquest.

As the Anglo-Saxons used food vessels which were generally made of either metal or wood, especially ash-wood, while their

drinking cups were either of horn or of glass, it seems likely that they had little need of pottery for ordinary domestic purposes. Most of the specimens attributed to the Anglo-Saxons are indeed in the form of cinerary urns, commonly made of clay, which exhibits no marks of much preparation before use, and appears to have been generally of such a quality as would not require much care in the selection. Many vases, or urns, of Saxon pottery are characterised by a globose body, with symmetrical swellings round the shoulders. This pottery is frequently ornamented with impressed zig-zag and various stamped designs, some by no means deficient in general effect, and corresponding with that which has been termed Germanic and which extended into Gaul.\* The pottery itself has rarely been highly fired.

It has been observed that the Saxon pottery found in the southern counties is generally better in quality and more elegant in form than that obtained in other parts of England, a fact sufficiently explained by the closer relations that subsisted between the south-east and the Continent.

The Museum at present possesses no definite examples of Anglo-Saxon pottery, though it is possible that some of the pieces classified with the mediæval wares in the following section may be attributed to a Saxon origin.

---

#### MEDIÆVAL POTTERY USED IN BRITAIN.

However difficult it may be to feel assured as to the pottery used in Britain much anterior to the Norman Conquest (1066), certain earthenware vessels have been discovered in situations and under circumstances which point to their having been used in this country for ordinary domestic wants in the times commonly termed mediæval. A small but characteristic series of such vessels will be found on the top shelf of Wall-cases I. to V. The forms of these early examples are usually deficient in elegance, although now and then a specimen may present to some extent the designs of better periods. The late Mr. Chaffers, in his notes "On Mediæval Earthenware Vessels,"† figured some of these forms taken from Norman manuscripts for comparison with vessels in his own collection, many of which afterwards passed into the possession of this Museum, and now form conspicuous objects in the collection. Nearly all those specimens which may be fairly considered to represent British mediæval manufacture offer but little that can be termed tasteful. At the same time ordinary pitchers and cups seem to have been employed at the

---

\* Figures and descriptions of this kind of pottery will be found in Brongniart's *Traité des Arts Céramiques*, pl. XXVI., XXVII.; Wright's *Celt, Roman, and Saxon*; and other works. See also "The Industrial Arts of the Anglo-Saxons." By the Baron J. de Baye; translated by T. B. Harbottle, 1893, p. 112.

† "Journal of the Archaeological Association," vol. i. p. 24.

tables of persons of some importance, and, indeed, were thought worthy of notice in the inventories of even royal households. Thus, Chaffers quotes the following entry in the payments of the executors of Eleanor, queen of Edward I., in the thirteenth century: "Item, Julianæ *La Potere*, pro CCC. *picheriis* viijs. vid." And again in the same document we find: "Item Johannis *Le Squeler*,† pro M<sup>le</sup>. et D. discis, tot patellis, tot salseriis, et CCCC. *chiphis* xlijs."

Many of the specimens in this collection have been dug up from time to time in the City of London, occasionally in association with coins and other objects which offer some clue to their date. Attention may be called to the pilgrim's bottle, F. 1 (Fig. 82), found in Cannon Street in 1851; and to the jugs or pitchers of Norman shape, such as that represented in Fig. 83. These are usually coated, to a greater or less extent, with a glaze of yellowish or brown colour; while a greenish speckled glaze is not uncommon on some of these vessels, such as the jug F. 10 (Fig. 84). This specimen was dug up in London Wall, and it may be

added that a vessel of similar form was discovered at a depth of 13 feet in Friday Street, City of London, associated with pennies of Henry III. and Edward I. Its date may therefore be referred to the latter part of the thirteenth century, but the form was probably not limited to this period.

The green glaze, which is conspicuous on several specimens of ware in this series, is essentially a lead silicate coloured by iron and copper silicates. The glaze on F. 12, a water pitcher found in

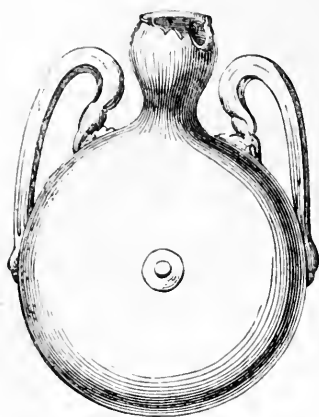


FIG. 82.



FIG. 83.



FIG. 84.

† The *squeler* was a seller of *esqueles*, from the French *écuelle*, a porringer, dish, or basin: whence also our word *scullery*.

Queen Street, Cheapside, in 1842, was analysed many years ago in the laboratory of this Museum by the late Professor von Hofmann, with the following results :—

Silica	-	-	-	-	-	43.04
Protoxide of lead	.	.	.	.	.	48.34
Protoxide of iron	-	-	-	-	-	3.31
Protoxide of copper	-	-	-	-	-	1.31
Lime	-	-	-	-	-	1.03
Alumina	-	-	-	-	-	2.65
Potash and soda	-	-	-	-	-	0.64
						<hr/> 100.32 <hr/>

This glaze was probably produced by dusting the vessels, before firing, with a mixture of powdered galena, or sulphide of lead, and iron and copper scales, when metallic silicates would be formed by the silica derived from the body; while the lime, alumina, and alkalies would also be obtained from the same source.

It is interesting to note that vessels having a similar green glaze have been found at considerable depths below the surface, sometimes associated with Roman relics.

The green-glazed puzzle jug, F. 19, is an example of the so-called *Tudor ware*, of special interest from the fact that it bears in bold relief the date 1571. This piece is figured by Mr. and Miss Hodgkin in their recently published work,\* where it stands as Figure 1.

The visitor should not overlook among the specimens in this series the early English costrel,† F. 22, represented in Fig. 85. This vessel, which was found in London in 1850, is made of red ware, marbled on the surface in white and red, and highly glazed. The lateral projections, in the form of lions' heads, are perforated for the passage of a cord or thong, so that the vessel might be suspended from the neck or waist and carried at the side, after the manner of a pilgrim's bottle. Some of the old costrels were no doubt of continental make, and were brought over to this country by travellers.

All the specimens described in this section will be found on the top shelf of the range of wall-cases numbered I. to V. on the eastern side of the Museum.



FIG. 85.

\* "Examples of Early English Pottery, named, dated, and inscribed." By John Eliot Hodgkin, F.S.A., and Edith Hodgkin. London, 1891.

† The term *Costrel*, formerly written *Costret*, is derived from the old French *Costrel*, a name given in allusion to the vessel being carried at the side.

While it is probable that earthen vessels of common manufacture continued in use in England even in royal\* and important noble† households, down to the fifteenth and sixteenth centuries, such vessels being, for the most part, made in this country, there is yet much reason to suppose that the German and Flemish wares found their way into those households, and that the earthen pots mentioned as "garnished with silver" were often of this better kind of manufacture.‡ Of the German stone-ware, that of the neighbourhood of Cologne and other localities near the Rhine was the most celebrated, and was exported to various countries, including England. It was in high repute in the sixteenth century. The Flemish ware, commonly known as *Grès de Flandres*, was also in great esteem from about 1540 to 1620. It is believed that most of the stone-ware vessels known as *Gray-beards*, of which good examples are furnished by F. 24, 25, and 26, were imported from the Continent.

The "gray-beard" or "long-beard" was a vessel much used in ale-houses in the sixteenth and seventeenth centuries. It was a bottle or jug having upon the neck or beneath the spout a rudely executed mask with a conspicuous beard. Such vessels were known as *Bellarmines*, a name sarcastically given to them in reference to Cardinal Robert Bellarmine, who rendered himself obnoxious by his opposition to the progress of the reformed religion in the Low Countries. Allusions to these jugs are to be found in many poems and plays of the period.

The encaustic tiles manufactured for use in ecclesiastical and domestic buildings from the thirteenth to the fifteenth century, and even later, form an interesting group of ceramic products; but the artistic character of many of their designs is so greatly superior to that of the contemporaneous pottery of this country that it appears highly probable that most of them were imported from abroad, especially from France. Several of these tiles are exhibited in pedestal case No 5, and have been already noticed (p. 48) in the description of the lead-glazes with which they are usually coated.

\* In the regulations for the household of Edward IV. (latter part of fifteenth century) among the orders for the "pitcher-house," it is directed that "the butler for the month delyverye the nightly, at the buttry barre for the kynge for all nyght; with the ale in new ashen cuppes, and two other for the watche, which of ryghte should be delyveryd againe at the cnpborde in the mornynge, with the pottes to serve men of worshippe in the halle." (*Liber Niger*, p. 78.)

† Mr. Chaffers points to the *Household Book* of the Earl of Northumberland (1512) as showing the common use of earthen pots at the tables of his dependants, adverting to the order that "Whereas *erthyn potts* be bought, that *ledder potts* be bought for them for serving of lyveries and meallys in my lord's hous."

An election feast of the Drapers' Company, in 1552, is quoted, at which earthen pots were used for ale and wine, gilt cups being employed "for red wine and ipoeras." So late as 1663, Pepys mentions, in his *Diary*, drinking out of "earthen pitchers and wooden dishes," when sitting at the merchant-strangers' table at a Lord Mayor's feast.

‡ Some excellent examples of silver-mounted stone-ware jugs may be seen in the South Kensington Museum. See Prof. Church's "English Earthenware," Part I., p. 17.



## STAFFORDSHIRE POTTERY AND PORCELAIN.

The collection of old Staffordshire ware occupies the range of Wall-cases, Nos. I. to V. (excepting the top shelf, which is devoted to various kinds of mediæval pottery), and is thence continued in Cases VI. to X., along the eastern side of the room. The earliest examples, about to be described in this chapter, will be found on the upper shelves of Cases I. to V.

Though the district in Staffordshire known as *The Potteries* has long been famous for the production of ceramic wares, it is somewhat difficult to trace the early history of the district in connexion with this manufacture. It has, indeed, been supposed that its clays were made into pottery by the Roman occupants of that part of Britain; but, although this supposition is highly probable, it does not seem to be supported by any positive evidence. Coarse ware appears to have been manufactured in the district certainly as early as the year 1500, if not indeed earlier. According to Dr. Shaw, "there exists documents which imply that during *many centuries* considerable quantities of common culinary articles were manufactured of red, brown, and mottled pottery, easily made from a mixture of different clays found in most parts of the district."\* It is to the abundance and variety of these clays, combined with the facility of obtaining coal, when coal came to be employed for the manufacture, that we may attribute the early progress of these potteries. In fact the geological character of the district is one highly favourable to the establishment of such manufactures; and though the materials now employed for the earthenware and porcelain so abundantly produced in the district may be derived from other localities, yet its supply of coal and of refractory clays for the firebricks required in the works, the actual establishment of these works, and the skilled labour at hand, still make it the chief locality for the ceramic manufactures of this country. The "pottery towns" of North Staffordshire, and the neighbouring places, inhabited by a very large population more or less connected with ceramic industries, include Stoke-upon-Trent, Burslem, Hanley, Longton, Shelton, Tunstall, Cobridge, Fenton, Etruria, and Dresden.

Among the productions of the district that of *Butter Pots* appears to have been undertaken at an early date. In 1661 it was of sufficient importance to attract the attention of Government, the potters of Burslem being then compelled by Act of Parliament to make their pots of a certain size and quality.

Several examples of these vessels, now extremely rare, are exhibited on the second shelf of Case II., and one of them

---

\* "History of the Staffordshire Potteries," by Dr. Simeon Shaw: Hanley, 1822, p. 97.

(G. 1) is represented in Fig. 86. Dr. Plot, in his "Natural History of Staffordshire," published in 1686, says (p. 108), "The butter they buy by the *pot*, of a long cylindrical form, made " at *Burslem* in this *county* of a certain size, " so as not to weigh above *six* pounds at most, " and yet to contain at least 14 pounds of " *butter*, according to an *Act of Parliament* " made about 14 or 16 years agoe,\* for regu- " lating the abuses of this *trade*, in the make " of the *pots*, and false packing of the *butter*." He also mentions that the cheesemongers of London had established a factory at *Uttoxeter*, and that the factors kept a surveyor during the summer, who probed the pots with an instrument called a *butterboare*. It was an object that the pots should be hard, and not so porous as to imbibe much water, which might be counted in the weight for butter. Dr. Shaw, writing in 1829, remarks that "the common



FIG. 86. "people of the district, at the present day, call " Irish tub-butter *pot-butter*," and the same use of the term is still retained.

The clays used in the Staffordshire Potteries during the seventeenth century appear to have been obtained exclusively from the neighbourhood, and for the most part from the coal measures. Fine sand, for admixture with the clays was dug from the hilly part of Baddeley Hedge and Mole Cop. Plot in his "History of Staffordshire," published in 1686, presents us with a valuable statement as to the clays then used, and the method of manufacture adopted at that time, including the mode of glazing. This account is sufficiently interesting to be quoted. After mentioning the Amblecot clay as the best, and as used for melting pots at the glasshouses of Amblecot and elsewhere, he continues:—

"Other *potters' clays* for the more common wares, there are at many other places, particularly at *Horsley Heath* in the parish of *Tipton*; in *Monway Field* above mentioned, where there are two sorts gotten, one of a *yellowish* colour mixed with *white*, the other *blewish*; the former stiff and weighty, the other more friable and light, which, mixt together, work better than apart. Of these they make divers sorts of *vessels* at *Wednesbury*, which they paint with *slip*, made of a *reddish* sort of *earth* gotten at *Tipton*. But the greatest *pottery* they have in this *county* is carried on at *Burslem*, near *Newcastle under Lyme*, where for making their severall sorts of *pots*, they have as many different sorts of *clay*, which they dig round about the *towne*, all within

\* 13 & 14 Charles II. cap. 26., 1661. Although not published until 1686, Plot's work must have been written several years prior to that date.

half a mile's distance, the best being found nearest the *coale*, and are distinguish'd by their *colours* and *uses* as followeth:—

“ 1. *Bottle clay*, of a bright whitish streaked yellow colour.

“ 2. *Hard fire clay* of a duller whitish colour, and fuller intersperst with a dark yellow, which they use for their *black wares* being mix't with the

“ 3. *Red blending clay*, which is of a dirty red colour.

“ 4. *White clay*, so called it seems, though of a blewish colour, and used for making yellow-colour'd *ware*, because yellow is the *lightest* colour they make any *ware* of.

“ All which they call *throwing clays*, because they are of a closer texture, and will work on the *wheel*; which none of the three other *clays* they call *slips*, will any of them doe, being of looser and more friable natures; these mixed with water they make into a consistence thinner than a *syrup*, so that being put into a *bucket* it will run out through a *quill*, this they call *slip*, and is the substance wherewith they *paint* their *wares*; whereof the

“ 1. Sort is called the *orange slip*, which before it is work't, it is of a greyish colour mixt which (*sic*) orange balls, and gives the ware (when annealed) an *orange* colour.

“ 2. The white *slip*, this before it is work't, is of a dark blewish colour, yet makes the ware yellow, which being the *lightest* colour they make any of, they call it (as they did the *clay* above) the *white slip*.

“ 3. The *red slip*, made of a dirty reddish clay, which gives *wares* a black colour.

“ Neither of which *clays* or *slips* must have any *gravel* or *sand* in them. Upon this account, before it be brought to the *wheel* they prepare the *clay* by steeping it in water in a square pit, till it be of a due consistence; then they bring it to their *beating board*, where, with a long *spatula*, they beat it till it be well mix't; then, being first made into great *squarish* rolls, it is brought to the wageing board, where it is slit into flat thin pieces with a *wire*, and the least stones or gravel pick'd out of it. This being done, they *wage* it, *i.e.*, knead or mould it like *bread*, and make it into round *balls* proportionable to their *work*, and then 'tis brought to the wheel and formed as the *workman* sees good.

“ When the *potter* has wrought the clay either into *hollow* or *flat ware*, they are set abroad to dry in fair weather, but by the fire in foule, turning them as they see occasion, which they call *whaving*. When they are dry they *stouk* them, *i.e.*, put *eurs* and *handles* to such *vessels* as require them. These also being dry, they then *slip* or *paint* them with their several sorts of *slip*, according as they design their *work*, when the first *slip* is dry, laying on the *others* at their leisure, the *orange slip* makeing the ground, and the *white* and *red*, the *paint*; which two colours they break with a *wire brush*, much after the manner they doe when they *marble* paper, and then *cloud* them with a *pensil*

when they are pretty dry. After the *vessels* are painted, they *lead* them, with what sort of *lead ore* they call *Smithum*, which is the smallest *ore* of all beaten into dust, finely sifted and strewed upon them, which gives them the *gloss*, but not the colour; all the *colours* being chiefly given by the variety of *slips*, except the *Motley colour*, which is procured by blending the *lead* with *manganese*, by the *workmen* call'd *Magnus*. But when they have a mind to shew the utmost of their *skill* in giving their *wares* a fairer *gloss* than ordinary, they *lead* them with *lead calcined* into powder, which they also sift fine and strew upon them as before, which not only gives them a higher *gloss*, but goes much further, too, in their work than *lead ore* would have done.

"After this is done, they are carried to the *oven*, which is ordinarily above eight foot high, and above six foot wide, of a round copped forme, where they are placed one upon another from the bottom to the top. If they be *ordinary wares* such as *cylindricall butter pots*, &c., that are not *leaded*, they are exposed to the *naked fire*, and so is all their *flat ware*, though it be *leaded*, haveing only *parting shards*, i.e., thin bits of old pots put between them, to keep them from *sticking* together. But if they be *leaded hollow wares* they do not expose them to the *naked fire*, but put them in *shragers*, that is, in coarse metall'd pots made of *marle* (not *clay*) of divers forms according as their *wares* require, in which they put commonly three pieces of clay called *Bobbs* for the ware to stand on, to keep it from sticking to the *shragers*; as they put them in the *shragers* to keep them from sticking to one another (which they would certainly otherwise doe by reason of the *leading*) and to preserve them from the vehemence of the *fire*, which else would *melt* them doune, or at least *warp* them. In 24 hours an *oven* of *pots* will be burnt, then they let the *fire* go out by degrees, which, in 10 hours will be perfectly done, and then they draw them for *sale*, which is chiefly to the poor *crate men*, who carry them at their *backs* all over the *countray*, to whom they reckon them by the piece, i.e., *quart* in *hollow ware*, so that six pottle, or three gallon *bottles* make a *dosen*, and so more or less to a *dosen* as they are of greater or lesser content. The *flat wares* are also reckon'd by *pieces* and *dosens*, but not (as the *hollow*) according to their *content*, but their different *breddths*."

Excellent examples of the brilliant lead glaze, described in the preceding extract, are furnished by some of the pieces of early Staffordshire ware in this collection, notably by the curious old vessels called *Tygs*.

One of these is represented in Fig. 87. The *tyg*\* was a drinking

---

\* The word *tyg* is derived from the Anglo-Saxon *tygel* or *tigel*, signifying a tile, or anything made of clay; whence *tygel-wyrhta* denoted a tile-worker or potter, a word that survives in the surname *Tilewright* and its corruptions, still common in Staffordshire.

cup having more than a single handle, so that several persons drinking from the vessel, and each using a separate handle, would bring their lips to different parts of the rim. They were largely used in the 16th and 17th centuries. The doubled-handled tygs are generally called "parting cups," while those with more than two handles, sometimes with as many as ten, pass under the name of "loving cups." The glaze on this and on the other pieces of old Staffordshire ware was essentially a glass formed of silicate of lead. Galena, the ordinary ore of lead (sulphide of lead), obtained from the Derbyshire mines, was dusted in a pulverised state upon the unbaked ware through a coarse cloth or a muslin bag, and a silicate formed by its reaction with the silica of the body of the ware during firing.

Some fragmentary tygs and other vessels from the site of old potteries at Tickenhall in Derbyshire, presented by Miss Lovell, of Calke Abbey, may be compared with the Staffordshire ware.



FIG. 87.

### *Slip ware.*

In the quotation from Plot on a previous page (p. 89), frequent mention is made of the use of "slip" in the decoration of the early productions of the Staffordshire potteries. Some valuable examples of the *slip ware* are exhibited in this collection, and a fine series of specimens will also be found in Mr. Henry Willett's collection, now in the British Museum.\*

The candlestick, G. 23 (Fig. 88) is interesting as bearing the date 1649, traced in slip figures; but it should be mentioned that Professor Church and some other authorities are disposed to assign this specimen to Wrotham. Coarse slip ware was undoubtedly made at Wrotham, in Kent, during the 17th century (see p. 165); but it is by no means easy in all cases to distinguish the productions of this locality from



FIG. 88.

\* A large number of excellent illustrations of slip-decorated ware, reproduced from photographs and printed in an appropriate brown tint, will be found in the "Examples of Early English Pottery, named, dated, and inscribed." By John Eliot Hodgkin, F.S.A., and Edith Hodgkin. London, 1891. Other pieces are figured by Mr. L. M. Solon in the beautiful etchings of his fine work "The Art of the Old English Potter." London and Derby, 1883.

those of the Staffordshire potteries. The large tyg, G. 17, the posset pot, G. 18, and the knobbed mug, G. 19, have likewise been doubtfully referred to Wrotham.\* There is reason to believe also that somewhat similar ware was produced at the Cock-pit, Hill Works, in Derby, and a few pieces, like the dish, G. 24, and the posset-pot, G. 33, have been attributed by some authorities to this factory.

We tread, however, upon more certain ground when we pass from these pieces of doubtful origin to the famous pottery known



FIG. 89.

as *Toft ware*, of which a highly characteristic example is presented by G. 25 (Fig. 89). This ware was undoubtedly turned out from Toft's works at Tinker's Clough, between Shelton and Newcastle-under-Lyme. In this, and similar ware, the ground is ornamented with rude designs, in slip; the slip, as explained in the quotation from Plot, being simply clay reduced to a batter-like consistence by admixture with a due proportion of water. The thick liquid was delivered from a pipette, and allowed to trail over the surface of the unbaked ware according to the fancy and skill of the workman. The slip was projected from the tube by blowing through the lips, or its delivery was controlled by placing the finger over the open end of the pipette and removing it when the emission of the slip was desired. After ornamentation with coloured slip, the ware was "leaded," or dusted with

---

\* Mr. L. M. Solon has suggested that the art of producing slip decoration may have been derived from the continent, and passed, by way of Kent, to the Midlands. ("Art of the Old English Potter," p. 28.)

galena powder, and on firing in the kiln the entire surface of body and slip became coated with a vitreous silicate of lead.

A brown bowl (G. 187) washed inside with a slip of Devon clay, and rudely decorated with incised figures cut through the slip, is interesting as bearing the date 1755. It will be found on the floor of Case 1.

In some cases the clay body was covered while damp with a thin coating of slip of a different colour, and a brush or toothed tool like a grainer's comb, was dragged over the surface, thus producing a veined or marbled effect. Examples of this *Combed ware* are presented by the specimens marked G. 32, 33, 39, 40, and 42. As the decoration of this pottery is only superficial, it is radically different from that of the marbled and agate-like ware of later date.

### *Agate Ware.*

In order to produce this pottery, thin layers of variously coloured clays, chiefly red and brown, were superposed one upon another, and from this pile of alternating strata thin slices were cut transversely by means of a wire. These striped slices, or "bats," were then carefully pressed into shape in moulds, and the irregular blending of the coloured clays produced a wavy pattern like that of certain agates and marbles. In some cases the effect was improved by a glaze of delicate bluish tone. The manufacture of this ware was greatly improved by Thomas Wheildon, of Little Fenton, and it is known that some of Josiah Wedgwood's early efforts were directed to the manufacture of knife handles in agate-ware.

Among the specimens of agate-ware exhibited in Case IV., are several knife-hafts. One of them is broken across to show the character of the variegated paste, from which it is seen that the pattern is not merely superficial, but passes completely through the paste.

A ware closely resembling some of the Staffordshire agate-ware, was certainly made at Leeds. A specimen in the collection (R. 42), is stamped "Leeds Pottery," and this piece has led to the identification of other specimens of agate ware which would otherwise have been attributed to the Staffordshire potteries.

### *Tortoiseshell Ware.*

The surface of this ware is covered with a variegated glaze, either of a rich brown or of a mottled purple and green colour, obtained by the use of manganese ore with galena. Thomas Wheildon of Little Fenton, was famous for the production of such "tortoise-shell ware," and it was also manufactured by Josiah Wedgwood during his partnership with Harrison and with Wheildon. Many of the pieces exhibited in Wall-case V., may be referred to the years 1750 and 1760.



FIG. 90.

ware, was also famous for producing pottery in imitation of fruit and vegetables. Among the miscellaneous specimens on the bottom shelf of Cases I. to V., will be found examples of *cauliflower ware* (G. 196), and *pine-apple ware* (G. 197).

The octagonal plates, G. 81 and 82, are characteristic examples of the ware, while the beautiful specimen G. 80 (Fig. 90) is noteworthy as a skilful piece of work, the body being double, and the outer case perforated with ornamental work.

Wheildon, who acquired reputation for his tortoise-shell and agate

### *Elers' Ware.*

On the Revolution of 1688, two brothers, John Philip and David Elers, descended from an ancient Saxon family of distinction, but settled for some time in Holland, accompanied the Prince of Orange to England, and settled after a while in Staffordshire as potters.

Finding at Bradwell Wood, a lonely spot about two miles from Burslem, an ochreous clay well suited to the manufacture of red pottery, they established themselves there and erected a pot-work for the production of their ware, while they hired an establishment for the sale of their products at Dimsdale, about a mile away. One of their objects seems to have been to manufacture a red ware similar to that of Japan or China, it being desirable at that time to imitate oriental porcelain and pottery. By careful selection and preparation of their clays, they succeeded in producing a much finer kind of ware than any that had previously been made in this country. From the character of the specimens preserved to us, it may be inferred that they were men of considerable taste and skill; an inference corroborated by the testimony of contemporary writers. Thus, Dr. Martin Lister, in a note appended to some letters published in 1693, referring to the soft red iron-ore or hæmatite of Lancashire, alludes to Elers' ware in the following eulogistic terms:—"I have this to add, that this clay *Hæmatites* is as good, if not better, than that which is brought from the *East Indies*. Witness the *Tea Pots* now to be sold at the potters in the *Poultry* in *Cheap-side*, which not only for art, but for beautiful colour too, are far beyond any we have from *China*. These are made of the *English Hæmatites* in *Staffordshire*, as I take it, by two *Dutch-men*, incomparable artists."\*

\* "Extracts of some letters from Mr. John Sturdie, of Lancashire, concerning iron ore; and more particularly of the *Hæmatites*, wrought into iron at Milthorpe Forge, in that County. Communicated by Dr. Martin Lister, F.R.S." *Philosophical Transactions*, vol. xvii., 1693, p. 695. Note on p. 699, dated May 1, '93.



The shop in the Poultry was kept by David Elers, while his brother carried on the factory at Bradwell Wood. The ware was sold at a very high price, and genuine specimens are now extremely rare. The Museum is fortunate in possessing a rather extensive series, believed to be authentic, having been obtained many years ago from the famous collection of Enoch Wood.

These specimens sufficiently show the fineness of texture resulting from great care in levigating and mixing the raw materials. According to Shaw, the body was composed of one part of Bradwell red clay and four parts of clay from Hill Top. The ware was accurately turned on the lathe and the pieces, generally of small size, were characterised by much delicacy and elegance of form. The little piggin (G. 62) and the dainty ladle (G. 64) both represented in Fig. 91, offer a striking contrast to the coarse ware which had been previously made in the Staffordshire potteries.



FIG. 91.

Much of Elers' ware was characterised by a peculiar mode of ornamentation, well illustrated in this collection. Small masses of damp clay were applied to the body, after it had been turned on the lathe, and the ornament was sharply stamped in relief with a metal die, on which the pattern had been engraved, the superfluous clay being then neatly removed. Fig. 92 represents a cup and saucer (G. 58 and 59) illustrating the style of ornament which was thus sealed directly on the ware, and not moulded. Professor Church has pointed out the precise physical characters of Elers' ware, while Mr. Solon has also called attention to its distinctive characteristics. It is a hard, dense, semi-vitrified body, having a specific gravity of 2.3 or 2.4.

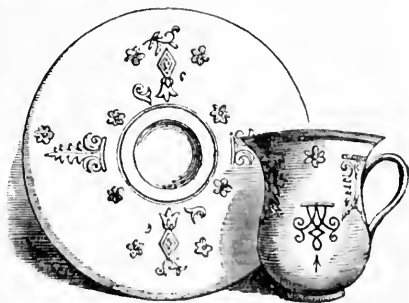


FIG. 92.

a cup and saucer (G. 58 and 59) illustrating the style of ornament which was thus sealed directly on the ware, and not moulded. Professor Church has pointed out the precise physical characters of Elers' ware, while Mr. Solon has also called attention to its distinctive characteristics. It is a hard, dense, semi-vitrified body, having a specific gravity of 2.3 or 2.4.

In addition to this fine red ware, the Elers are said to have manufactured a black body, from a mixture of clay and iron-stone, which may have been the precursor of Wedgwood's famous "Egyptian ware." Great secrecy was maintained in all the details of manufacture; it is said, indeed, that an idiot turned the thrower's wheel, and that the most ignorant labourers were employed for those parts of the work which were not executed by John Philip Elers himself. Dr. Shaw mentions\* that

\* "History of the Staffordshire Potteries," p. 118.

Twyford was supposed to be the first, by pretending carelessness, to have entered the works and found out the processes employed. Eventually Mr. Astbury,\* by feigning idiocy, and obtaining employment in the works, learned the secrets, and made red ware,† being soon followed in this business by other potters. From the competition thus arising, and from annoyance by the other manufacturers of the district, the Elers discontinued their works, and, according to Dr. Shaw, removed in 1710 to Lambeth or Chelsea, where they connected their work with "the glass manufacture established in 1676 by Venetians, "under the auspices of the Duke of Buckingham."‡

The character of much of *Astbury's ware* may be seen in the specimens G. 48 to G. 52. His relief ornaments were usually stamped in pipe-clay, or Devon clay, on a body of brown or red ware, and the whole coated with lead glaze. Though the ware was coarser than Elers', it was bright and effective; whilst the ornaments, though ruder and less sharp, seem to have been more varied, including not only flowers and geometrical figures, but animals and heraldic devices.

### *Salt-glazed Ware.*

It is probable that the use of salt as an agent in glazing pottery was introduced into Staffordshire by John Philip Elers, the glaze employed before his time having been mostly plum-biferous. The well-known story which attributes the discovery of the glazing power of salt to a farm servant, who allowed a pot of brine to boil over, may be dismissed as unworthy of credence.

The name of *Elizabethan Ware*, sometimes applied to the early salt-glazed pottery, is quite inappropriate, inasmuch as its manufacture was not established until long after the time of Queen Elizabeth. It has also been termed *Crouch Ware*, a name which, according to Mr. Solon, was derived from the use of the white Derbyshire clay, known as "Crouch clay." Dr. Shaw states that in manufacturing salt-glazed ware, common brick clay and sand from Mole Cop were first used, and subsequently Can marl and this sand, some potters employing with the sand dark-gray clay from the coal pits. Some of the principal

\* Mr. John Astbury, who introduced the use of flint into the Potteries, died in 1743, at the age of 65 years.

† Dr. Shaw mentions that Twyford and Astbury carried on a manufactory together, making red porcelain (?) and white pottery, and employing a salt glaze.

‡ "Chemistry of Pottery," 1837, p. 411.

§ The account given is that in 1680, at Stanley Farn, near Mr. Palmer's pottery, at Bagnall, the servant of Mr. Joseph Yates was boiling salt in water to be used in curing pork, and that during her temporary absence the mixture boiled up, and ran over the sides of the earthen pot containing the brine. The earthen pot became red hot, and when cool was found to be glazed. Mr. Palmer availed himself of the accident, glazing common brown ware by means of salt, and in this he was soon followed by other manufacturers. See Shaw's "History of the Staffordshire Potteries," p. 108.

|| See Mr. Solon's remarks in his "Art of the Old English Potter," 1883, p. 71.

potters were in the habit of adding a pint of red lead to each bushel of salt.\* Around the ovens employed for firing the ware, there was a scaffold on which a fireman stood to cast in the salt. The vapour arising from the salt-glazing is described, about the end of the 17th century, as being so considerable as to produce a dense white cloud, sometimes so thick as to cause persons to run against each other in the streets.

At that time the ovens are described "as always adapted to the quantity of articles made during each week; and no manufacturer of that period fired more than one oven-full weekly, commencing on the Thursday night, and finishing about midday on Saturday. There were about 22 ovens then in Burslem and its vicinity, each with eight mouths at equal distances."

For the chemical principles involved in salt-glazing, reference may be made to p. 57. The ware was protected in the kiln by being enclosed in saggars, one of which is exhibited in the collection (G. 100). It was found built into an old wall in the neighbourhood of Hanley, Staffordshire. The sides exhibit four perforations, through which the vapour of the salt gained access to the enclosed pieces of ware, and the sagger has itself become irregularly coated with salt glaze. On account of its size this specimen is placed on the bottom shelf at the right-hand corner of Case V.

The paste of some of this ware is so fine as almost to resemble a porcelain. Indeed, Professor Church observes that, had a little more alkali entered into the composition of the better and whiter specimens, it would have been in reality a kind of porcelain. It is extremely hard, and the glaze is but little inferior in hardness to quartz. The specific gravity of the ware is about 2.2.†

Some of the salt-glazed ware of early date was shaped by pressing the moist paste in metal moulds, the ornament thus possessing very sharp relief; whilst other pieces were "cast"



FIG. 93.



FIG. 94.

\* "History of the Staffordshire Potteries," p. 110.

† "Catalogue of the Specimens of Old English and other Pottery in the Collection of Arthur Herbert Church. Cirencester, 1870, p. 8. Also: "English Earthenware," by Prof. A. H. Church, Part I., 1884. (South Kensington Museum Handbooks.)

in moulds of plaster-of-Paris, the slip being introduced so as to form at first a thin layer, lining the mould, and this operation being repeated until a sufficiently thick body was obtained. Many of the stoneware models or "blocks" from which the plaster moulds were taken are here exhibited, together with one or two of the metal moulds, now become extremely rare.

G. 101 (Fig. 93) is a thick stone-ware block for the body of an eight-sided tea pot, whilst G. 104 (Fig. 94) is a similar model for the body of a jug, ornamented with the pecten-shell pattern so common on this ware. The specimens marked G. 167 and 167*a* are metal moulds, which would leave upon the pressed ware an impression of the pattern as sharp as though it were delivered from a seal.

The upper shelf in the lower compartments of Wall-cases I., II., and III. contains a fine series of *drab-coloured* salt-glazed ware. Fig. 95 (G. 97) represents a specimen of this beautiful manufacture, with its characteristic decoration.



FIG. 95.

The drab-coloured surface is decorated in relief with white ornaments in Devon clay, and it will be noticed that in many of the pieces these ornaments bear a striking resemblance to the pressed decoration on Elers' ware; a resemblance so close, indeed, that many authorities have been led to believe that this rare ware may safely be attributed to the Elers' factory. Many of the pieces exhibit marks of having been turned on the lathe before being ornamented.

As types of the ordinary white salt-glazed ware, reference may be made to Figs. 96 (G. 111) and 97 (G. 112).



FIG. 96.



FIG. 97.

The extreme thinness and delicacy of the finer specimens of this ware are marked features in such pieces as the trays or small dishes, G. 164, 165, 166, and 168. There is rarely any mark which will fix the locality or date of a particular piece of salt-glazed ware, but the large tureen, G. 111, has upon its base

the initials "J. B." in cursive characters, and the date 1763 rudely scratched in the paste under the glaze. The plate, G. 173, is notable, inasmuch as the border is ornamented in relief with a military trophy, the Prussian eagle, a portrait of Frederick the Great, and an inscription, "Success to the King of Prussia and his Forces:" this allusion to the victories of Frederick the Great, therefore, gives an approximate date to the specimen. Mr. H. Willett has a similar plate, with the same inscription, in tortoise-shell ware; thus showing that the two kinds of ware were manufactured at the same period, and perhaps in the same factory.

It is believed that the manufacture of salt-glazed stone-ware in Staffordshire extended from about 1690 to 1780, though it probably survived at Burslem until a much later period. Some of the finest productions may be referred to about the year 1750. The following useful chronological arrangement is given by Prof. Church :—\*

"*Period I.*—Prior to 1720. Impressed and applied ornaments on engine-turned vessels: archaic period.

"*Period II.*—1720 to 1740. Flint introduced into the body: fine sharp work.

"*Period III.*—1740 to 1760. Extensive use of coloured enamels in decorating the salt-glazed surface.

"*Period IV.*—1760 to 1780. Prevalent ornamentation of basket and pierced work: period of decadence."

Examples of the modes of ornamenting salt-glazed ware by enamelling and gilding may be seen in the specimens G. 182 to 186; while the plates, G. 180 (Fig. 98) and G. 181, show how



FIG. 98.

this ware was occasionally decorated by means of transfer prints. The printing was probably executed by Sadler and Green of Liverpool (*see* pp. 156, 157).

\* South Kensington Museum Art Handbooks: English Earthenware, Part I., 1884, p. 61.

*Wedgwood Ware.*

[Wall cases VI. to X. ; upper shelves.]

Although the Staffordshire pottery was by no means so deficient, either in tasteful design or in execution, as has often been supposed, anterior to the productions of Wedgwood, there can yet be little doubt that this justly celebrated potter gave a new impulse to the manufactures produced at the Potteries. Josiah Wedgwood, the youngest son of Thomas and Mary Wedgwood, was born at Burslem in July 1730.\* It appears that his early education did not extend beyond the ordinary course of reading, writing, and arithmetic, taught at a school at Newcastle-under-Lyne; but he was one of those who continue to educate themselves throughout life, and thus acquire deserved advantages and reputation.

Soon after his father's death, in 1739, he was removed from school, and at this early age placed as a "thrower" under his brother Thomas, who had succeeded to the Churchyard Works at Burslem, previously occupied by his father. In 1744 Josiah was apprenticed as a potter to his brother for the term of five years. When freed from this service he entered into a partnership with John Harrison and Thomas Alders at the Cliff Bank Pottery, but the connexion was of only short duration, and he soon associated himself with Mr. Thomas Whieldon, of Fenton, where he manufactured, among other things, a green ware with a remarkably brilliant glaze. This connexion, not suiting Wedgwood's views, he returned to Burslem in 1759, and commenced business for himself in part of the Ivy Works belonging to his cousins, and there manufactured small ornamental articles. After removing to the premises known as the Brick-House Works ("Bell Works") he was fortunate enough to obtain the patronage of Queen Charlotte, who so much admired his "cream ware"—a material which had received great improvements at the hands of Wedgwood—as to desire that it should be called "Queen's Ware." The foundation of his reputation having been thus laid, orders flowed freely to his manufactory at Burslem.

Wedgwood was also fortunate in connecting himself commercially with his friend Mr. Thomas Bentley, a merchant of Liverpool, who became his partner, so far as the production of ornamental objects was concerned, and managed a warehouse in London for the sale of ornamental goods. Mr. Bentley's classical acquirements and knowledge of art were of the greatest service to Wedgwood; and, by procuring the best models, they were enabled to produce those exquisite cameos, medallions, vases and other ornamental objects for which the firm became so justly celebrated. Of these objects the finest were produced either in

---

\* On Wedgwood's monument in the parish church at Stoke-upon-Trent he is said to have been born in *August* 1730, but the register of St. John's, Burslem, shows that he was baptised in the previous month.

the black body, called Egyptian ware or basaltes, or in the beautiful material known as "jasper ware." The discovery of the jasper was certainly one of Wedgwood's greatest achievements. By the use of either sulphate or carbonate of barium, or both, he obtained a dense compact paste approaching porcelain in many of its characters, sufficiently hard to receive a good polish, and capable of being delicately and uniformly tinted by the presence of certain metallic oxides. One of Wedgwood's own receipts for the jasper composition, preserved in the Mayer MSS., and published by Miss Meteyard, specifies six parts of cawk (or massive barium sulphate, the mineral known as *heavy spar* or *barytes*), three of potter's clay, one of flint, and one-fourth of carbonate of baryta.

Josiah Wedgwood died in January 1795, at Etruria, the classic name which he had given to the locality near Newcastle-under-Lyne, where he had erected his extensive works. His memory is perpetuated in the "Wedgwood Memorial Institute" at Burslem, his native place.\*

The collection of Wedgwood ware occupies the upper half of the entire range of wall-cases numbered VI. to X. Not perhaps so rich in special departments as certain private collections may be, it is nevertheless of exceptional value to the student, inasmuch as it contains characteristic examples of nearly all the varieties of ware, both useful and ornamental, manufactured by Wedgwood.

The earliest piece in the collection, identified with the Wedgwood family, is the puzzle-jug (G. 219), represented in Fig. 99. This vessel, believed to be unique, is of coarse brown paste, coated with green lead-glaze, and bears an incised inscription,

*"John Wedg Wood, 1091."*

It is undoubtedly the work of John Wedgwood, great uncle to Josiah Wedgwood, being the eldest brother to Josiah's paternal grandfather. John Wedgwood was born in 1654 and died in 1705. He was the grandson of Gilbert Wedgwood, the first of the name who settled in Burslem in the early part of the 17th century.

Numerous examples of Wedgwood's famous *Queen's Ware* will be found in the collection. These not only display the various



FIG. 99.

\* For a full account of Wedgwood and his productions, the visitor may consult "The Life of Josiah Wedgwood," "Wedgwood and his Works," and "The Wedgwood Handbook," all three by Eliza Meteyard; "The Wedgwoods: being a Life of Josiah Wedgwood," by Llewellynn Jewitt, F.S.A.; and "Wedgwood: an Address, by the Right Hon. W. E. Gladstone," delivered on laying the foundation stone of the Wedgwood Memorial Institute, at Burslem, Oct. 26, 1863.

shades of cream-colour which he employed, but show the excellence of the "potting" which characterised all Wedgwood's productions. The butter-boat (G. 251)



FIG. 100.

Fig. 100, is an early unmarked specimen, made at the Bell Works and obtained from Enoch Wood's collection. The large centre-piece (G. 258) is an important specimen, admirably illustrating the characteristics of the ware, and has been figured, as a typical example, by

Professor Church in the "South Kensington Handbook."

Some of the cream-ware is decorated with painting and gilding, while other pieces are ornamented with transfer-printing. The tea-canister (G. 252) is an early example of Liverpool-printed ware, figured in Miss Meteyard's *Life of Wedgwood*, vol. ii., p. 64. A tea-pot (G. 255), presented by the Rev. J. Allen, is printed in purple transfer, with a tea-drinking scene on one side, and on the other side the following stanza:—

"Kindly take this Gift of mine,  
"The Gift & giver I hope is thine;  
"And tho' the value is but small,  
"A loving Heart is worth it all."

A sample of white *Pearl Ware*, of some interest is furnished by the sugar-basin, G. 283. The cups and other objects, distinguished as G. 273 to G. 278, presented by Mr. Hugh Owen, formed a portion of the breakfast service made by Wedgwood for George III. for use at Gloucester Lodge, Weymouth.

The two-handled vase (G. 308) is as excellent an illustration of *Granite Ware*, as G. 309 is of *Onyx Ware*. The basin (G. 307) is a sample of so-called *Bamboo Ware*. The pie-dish, (G. 306) is one of the dishes, representing baked pie-crust, made by Wedgwood in times of scarcity, in order to avoid the use of flour. In the *Life of George Brummell*\* it is said that "the scarcity two years after Brummell's retirement, viz., in July 1800, was so great that the consumption of flour for pastry was prohibited in the Royal Household, rice being used instead; the distiller left off malt-ing, hackney-coach fares were raised 25 per cent. and Wedgwood† made dishes to represent pie-crust."

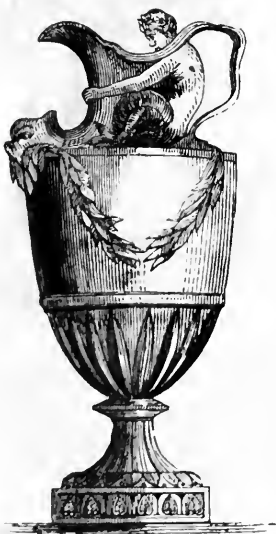


FIG. 101.

\* *Life of George Brummell, Esq.*, by Capt. Jeffs, 1844, vol. i. p. 49.

† As Josiah Wedgwood died in 1795, this must have reference only to the firm of Wedgwoods.



Some of the most important examples of Wedgwood's productions in this collection are the *Egyptian Ware* or *basaltes* (G. 310 to G. 335), among which the ewer, represented in Fig. 101, is specially noteworthy. The design is emblematic of Water; a seated Triton, surrounded by the sea, clasps the neck of the vase, which is ornamented with a dolphin's head, whilst the body is decorated with a festoon of bulrushes and a border of leaves.

Another fine specimen of black Egyptian ware is represented in Fig. 102. This is an *oviform amphora* and cover (G. 323), having the two handles in the form of serpents springing from the heads of the Medusæ; the body is ornamented in relief with a classic group representing the apotheosis of Homer; whilst the cover is surmounted by a Pegasus.



FIG. 102.



FIG. 103.

The lamp (G. 324), shown in Fig. 103, is another excellent specimen. On a triangular base are three classic figures grouped around a central shaft, which supports a shallow vase bearing three small burners in scallop shells; the cover is terminated by a burner in the form of a palm tree, with three seated figures at its base.

On the top shelf of case is a large bust of Cornelius de Witt, in black Egyptian ware. Wedgwood's life-sized busts of Dutch patriots were modelled about the year 1779, and had a large sale in Holland.

Some of Wedgwood's black ware was decorated with paintings in encaustic, or unglazed enamel colours, thus imitating the effect of the ancient Greek painted vases. Examples of this mode of decoration are furnished by the vases G. 336 to G. 338, which are painted with classic figures in red and white. The finest specimen, however, is the immense vase, or crater (G. 343) which is mounted on a pedestal in front of a column near Wall-case I., and is figured in the frontispiece to this Handbook. It is a copy of a Greek vase in the British Museum, belonging to the latest period of vase-painting known as the style of the *Basilicata*, and supposed to be not earlier than 200 B.C. The original vase was formerly in Sir W. Hamilton's collection. This copy was the largest work executed by Wedgwood. Its height is 2 feet 9 inches, and its greatest diameter 18 inches. This valuable specimen of Wedgwood's work was presented to the Museum by the late Apsley Pellatt, Esq.

Of all Wedgwood's productions, the finest was unquestionably his *Jasper Ware*. The peculiarities of this beautiful material were due to the use of minerals containing barium—notably the sulphate, or "heavy spar"—as constituents of the paste. By admixture with various oxides, the jasper received a variety of delicate tints, the most characteristic being blue, sage-green, and lilac. In some cases the colour permeated the body, whilst in others it was merely superficial, being due to a wash of coloured paste, or "*jasper dip*"; occasionally the solid and the dip were associated, the coating and the body being of different colours.

The fine effect produced by applying ornaments of white jasper to a delicate blue ground is well illustrated by the two vases, G. 339 and G. 340. The latter is a very charming piece, and has been figured in Prof. Church's "*Handbook of English Earthenware*," Fig. 52. It is an oviform amphora, having the body ornamented with a frieze of figures representing Apollo and the nine Muses, and the cover surmounted by a white figure of Pegasus.

But the choicest piece of Wedgwood ware in the collection is undoubtedly the copy of the famous *Portland or Barberini Vase*, with the bas-reliefs executed in white jasper, and laid on a fine black ground (G. 342).

This is one of the original copies made by Wedgwood, and was obtained directly from the late Mr. Charles Darwin, who was one of Wedgwood's descendants. The original vase is formed of dark blue transparent glass with the bas-reliefs laid on in white semi-opaque paste. It was discovered between the years 1623 and 1644, in a marble sarcophagus buried beneath the mound called Monte de Grano, near Rome, which was opened by order of Pope Barberini (Urban VIII.). The sarcophagus was formerly supposed to be that of the Emperor Severus and his mother Mamaea, who were slain in Germany, A.D. 235. The vase was brought to England by Sir William Hamilton in 1784, and purchased by the Duchess Dowager of Portland. At the sale of her

museum in 1786 it was bought in by the Duke of Portland for 1,029*l.*, and was then lent to Wedgwood for the purpose of being copied. The original vase is now in the British Museum, where, on Feb. 7th, 1845, it suffered violent injury at the hands of one William Lloyd; but it has since been admirably restored.

*Wedgwood Cameos, &c.*—An illustrative collection of cameos and intaglios in Wedgwood ware is displayed in two glass cases placed one on each side of the pillar opposite to Wall-case VIII. Each specimen is mounted in a gilt setting, which freely exposes the back. Nos. 1 to 189 form a fine series of black medallions of classical portraits, executed in basaltes, and bearing for the most part the mark of Wedgwood and Bentley. Nos. 190 to 194 are classical intaglios in basaltes. Nos. 195 and 196 are cameo portraits in plain white ware; and the remaining specimens, Nos. 197 to 213, are examples of jasper cameos in two or more colours.

The most important specimen in this series is the large relief plaque, No. 214, represented in Fig. 104. This slab, which

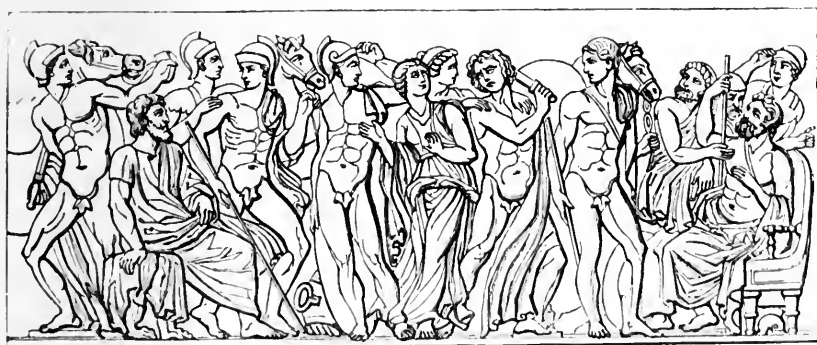


FIG. 104.

measures 15 inches by 6 inches, is of sage-green jasper with cameo-work in white, representing the sacrifice of Iphigenia.

The modelling is attributed to the Italian artist Pacetti. The subject is copied from the sculpture on the sarcophagus in which the Barberini vase was discovered, and which is preserved in the Museum of the Capitol at Rome.

### *Wedgwood Porcelain.*

It is believed that the manufacture of porcelain was not attempted by Josiah Wedgwood, but it was subsequently undertaken at Etruria by his nephew Thomas Byerley. The production of porcelain at these works commenced probably about the year 1808, but was carried on for only a short period. A small series of specimens, marked G. 356 to G. 362, is exhibited in Wall-case X. Each piece is marked in red with the name "WEDGWOOD."

*Old Staffordshire Ware, exclusive of Wedgwood Ware.*

[Wall-cases VI. to X. ; lower shelves.]

While the upper shelves of the range of glass-cases along the eastern wall are devoted to the Collection of Wedgwood Ware, all the lower shelves of these cases are occupied by the productions of other Staffordshire potters, many of whom were either the contemporaries or the immediate successors of Wedgwood. A few pieces, at the commencement of the series, are of still earlier date.

The octagonal plate in delft ware (G. 363), painted with a river-scene, is marked in blue under the glaze

*"J. T. March 4<sup>e</sup> 1. 17<sup>39</sup>/<sub>40</sub>"*

These initials are those of Josiah Twyford, of Shelton, who is mentioned by Dr. Shaw as the first potter who introduced the use of pipe-clay into the Staffordshire potteries.

The obelisk in granite ware (G. 364), and the bust of George Washington (G. 367) bear the impressed mark, "Ra. Wood, Burslem." This Ralph Wood was the father of Aaron Wood, who was apprenticed to Dr. T. Wedgwood, and he was, consequently, the grandfather of Enoch Wood, whose name appears on several other specimens, such as G. 368.

The earliest pieces of this pottery are marked "E. WOOD," and the latest "ENOCH WOOD & SONS," while others, like the bust of the Emperor of Russia (G. 372) are stamped "WOOD & CALDWELL." The latter piece is inscribed "Alexander, Æt. 35. Moscow burnt. Europe preserved, 1812." The mark, indicating the partnership between Enoch Wood and James Caldwell, was used from 1790 to 1818.

Mr. Enoch Wood was an enthusiastic collector of Staffordshire pottery, and from his collection a large number of the specimens in this Museum were obtained. In 1816 the Staffordshire manufacturers assembled to celebrate the fiftieth anniversary of the opening of the canal between the Trent and the Mersey, a work of the greatest importance to them. A museum was then inaugurated, illustrative of the progress of Staffordshire pottery, and some well-known old works, which had been closed for many years, were searched for specimens. A selection of these examples, obtained from Enoch Wood, to whom the collection belonged, forms the base of the Staffordshire series exhibited in this Museum. Other portions of the Wood collection are in the South Kensington Museum, and in the Museums of Edinburgh, Dublin, Stoke-on-Trent and Hanley ; while part of the collection is exhibited at Dresden.

Among the many potters whose manufactures are here illustrated an honourable place must be assigned to John Turner, of Lane End, whose works are exemplified by specimens G. 405 to G. 411. The excellence of his blue and white jasper-ware will

be seen in the vase G. 408 and the dish G. 409*a*. John Turner died in 1786, but the business was continued by his sons. A patent was granted to William and John Turner in 1800, for a new method of manufacturing porcelain and earthenware by the introduction of a material known in Staffordshire as "Tabberner's Mine rock." "Little Mine rock," and "New Rock" (Specifications of Patents, No. 2367, January 9, 1800). The bowl G. 412*b*, is marked "Turner's Patent."

Several specimens, G. 390 to G. 393, illustrate the work of Elijah Mayer, of Hanley, whose black Egyptian ware and buff and cane-coloured bodies are of very delicate texture. With these are some specimens, presented by Mr. W. H. Goss, F.G.S., which, though unmarked, are known to have been made by J. Mayer of Hanley.

A large jug in blue jasper, with white raised figures representing the four seasons (G. 447) is an excellent example of the work of William Adams, who was one of Wedgwood's pupils, and afterwards a manufacturer on his own account. His blue and white jasper ware closely resembled Wedgwood's.

Several specimens, G. 397 to G. 403*a*, illustrate the various kinds of ware, including blue and white jasper, made by Neale & Co., of Hanley, who were contemporaries of Wedgwood and imitators of his works. The important piece G. 401, represented in Fig. 105 is in green glazed earthenware, decorated with gilding.

H. Palmer, who was at one time in partnership with Neale, unscrupulously copied Wedgwood's patterns. Some small intaglios in black Egyptian ware, presented by Mr. Illidge, are stamped with Palmer's name, or in some cases with the initials "H.P."

Voyez was a clever French modeller, at one time in the employ of Josiah Wedgwood, and afterwards with Palmer and Neale & Co. A characteristic jug, modelled by him with figures in high relief and dated 1788, is exhibited as G. 383.

Several pieces of earthenware and porcelain (G. 483 to G. 442*a*) bear the mark of "DAVENPORT." Mr. John Davenport established works at Longport in Staffordshire, in 1793, and the business passed to his descendants.



FIG. 105.

Of the china made by Miles Mason, in the early part of the present century, some characteristic pieces are here exhibited (G. 463 to G. 466.) In connexion with these specimens it may be interesting to quote the following advertisement from the *Morning Herald* of Monday, October 15. 1804:—

#### MASON'S CHINA.

It has hitherto been the opinion, not only of the Public, but also of the Manufacturers of this Country that the earthenware of these Kingdoms are unequal to those of Foreign Nations for the fabrication of china. Miles Mason, late of Fenchurch Street, London, having been a principal purchaser of Indian Porcelain, till the prohibition of that article by heavy duties, has established a Manufactory at Lane Delph, near Newcastle-under-Line, upon the principle of the Indian and Sève (*sic*) China. The former is now sold at the principal Shops only in the City of London, and in the Country as British Nankin. His article is warranted from the Manufactory to possess superior qualities to Indian Nankin China, being more beautiful as well as more durable, and not so liable to snip at the edges, more difficult to break, and refusable or untable by heat, if broken. Being aware that to combat strong prejudices with success, something superior must be produced: he, therefore, through the medium of his Wholesale Friends, proposes to renew or match the impaired or broken services of the Nobility and Gentry, when by a fair trial or conjunction with foreign china, he doubts not that these fears will be removed, and, in a short period, the Manufactories of Porcelain, by the patronage of the Nobility of this country, will rival, if not excel, those of foreign Nations.

N.B. The articles are stamped on the bottom of the large pieces, to prevent imposition.

Several specimens, such as G. 465, bear the well-known mark, "MASON'S PATENT IRONSTONE CHINA." The improvement, for which a patent was granted in 1813, consisted in using the scoria or slag of ironstone pounded and ground in water, in certain proportions, with flint, Cornwall stone and clay, and blue oxide of cobalt. (Specifications of Patents, No. 3724, July 23, 1813.)

On the lower shelves of Cases IX. and X. is an illustrative series of *Spode Ware* (G. 469 to G. 492), mostly presented by Mr. Battam. The original Josiah Spode was apprenticed to Thomas Whieldon, of Fenton, in 1749. He conducted works at Stoke-upon-Trent, where he manufactured blue-printed, cream-coloured, and other wares. On his death in 1798, his son Josiah continued the business, and soon afterwards commenced the manufacture of porcelain, which he is said to have improved by introducing the use of bone-earth and of felspar; it has been shown, however, by Professor Church that he was not the first to employ bone-earth in either porcelain or earthenware. He died in 1827, and was succeeded in the business by his son, Josiah Spode, at whose death the works passed into the hands of Messrs. Copeland and Garrett.

The vase (G. 476), with perforated cover, mounted on a tripod stand formed by three dolphins, executed in red terra-cotta,

with black ornaments in relief, is an excellent example of early Spode ware (Fig. 106).



FIG. 106.

The specimens G. 415 and G. 416 are examples of the *New Hall China*, the earliest porcelain made in Staffordshire. The New Hall Works at Shelton were established by a company of potters, who, in 1777, purchased Cookworthy's patent which had been extended to Champion. (See p. 132.) The New Hall Works were closed in 1825.

The following is an alphabetical list of other Staffordshire potters whose productions are represented in this collection:—

Baddeley, W.*	Meir, F.
Batty & Co.	Mist.
Birch.	Mohr & Smith.
Bott & Co.	Moseley.
C. & H. (Cookson and Harding).	Myatt.
Clementson, J.	Phillips.
Clews.	Poole, R.
Cyples.	Pratt.
Dale, J.	Ridgway.
Ducroz & Millidge	Ridgway & Sons.
Green, T.	Ridgway, W., Son & Co.
Hackwood.	Riley.
Harding.	Rogers.
Harley.	Salt.
Heath.	Shorthose & Co.
Hollins, S.	Shorthose & Heath.
Hollins, T. & J.	Sneyd, T.
Keeling, Toft & Co.	Steel.
Lakin.	Stevenson, A.
Lakin & Poole.	Taylor, G.
Mason, Miles.	Walton.
Mayor & Newbold.	Wilson.

\* Baddeley's ware is marked "Eastwood," the place of manufacture.

## WEST SIDE.

*Modern Staffordshire Ware.*

[Wall-cases XXXV. to XXXIX.]

The Staffordshire series is continued on the western side of the Museum, where the upper part of the range of wall-cases is devoted to illustrations of the modern manufactures of the Potteries. Many of these specimens were obtained from the Great Exhibition of 1851, and have become of interest as examples of the finest Staffordshire productions of that period.

The western series commences with examples of the manufactures of Mr. Copeland, and of Messrs. Copeland and Garrett (G. 493 to G. 523), thus continuing the collection of Spode ware on the eastern side. William Copeland was a partner in Spode's firm, and his son, the late Mr. William Taylor Copeland, subsequently became possessor of the works. The style of the present firm is "Messrs. W. T. Copeland & Sons."

The famous house of Minton's was founded at Stoke-upon-Trent, in 1790, by Thomas Minton, who had been in Spode's employ. The business was afterwards enormously extended by the late Mr. Herbert Minton, who for a long time was in partnership with his nephews, Mr. M. D. Hollins and Mr. Colin Minton Campbell. The series G. 529 to G. 574 illustrates some of the most noteworthy productions of this factory, including many pieces with Minton's early marks.

From a technological point of view, much interest attaches to the specimens illustrating the manufacture of tiles and tessellated pavements. Nos. G. 551 to G. 553, show the kaolin or china clay, pressed into the form of tesserae according to Prosser's patent. (Specification No. 8548, June 17th, 1840.)

The dry clay, in a state of fine powder, is subjected to hydraulic pressure, and its particles are thus forced to cohere into the required shape without employing the agency of water. It is then vitrified by firing.

In the centre of the entrance hall of the Museum is an example of a tessellated pavement from a design founded on a Roman mosaic pavement discovered at Woodchester in Gloucestershire. This pavement was executed by Messrs. Minton and Co., with tesserae of their manufacture.

The examples of modern tiles of Minton's manufacture (G. 554 to G. 573) are placed for convenience on the top shelf. Many of these are encaustic tiles. Each tile usually consists of three strata of clay, the superficial stratum being impressed with the pattern from a wooden mould. Coloured slips are then poured into the depressions, and, after partial drying, the surface is levelled down and the tile fired.



The western series of Staffordshire specimens contains examples not only of the productions of Copeland's and Minton's factories, but also of the work of the following Staffordshire manufacturers, viz.:—W. H. Goss, C. Meigh & Sons, F. & R. Pratt, J. Richhuss and C. Toft, and Ridgway & Co. The *ivory porcelain*, presented by Mr. Goss, of Stoke-upon-Trent, is a singularly beautiful material.

An adjacent pedestal case, No. 4, is devoted to the exhibition of a fine collection of Staffordshire porcelain and pottery, of modern make, obtained mostly from the Great Exhibition of 1851. Attention may be called to the large wine cooler (G. 575) in cream-coloured ware, manufactured by Messrs. Minton & Co., and represented in Fig. 107. Among the most noteworthy of Minton's productions in this case are the handsome porcelain bottles and vases (G. 576, G. 580), richly decorated after old Sèvres models. Messrs. Minton have for many years had the advantage of the services of M. Leon Arnoux, and later those of M. L. Solon, in the production of their artistic manufactures.



FIG. 107.

Several admirable specimens of Copeland's productions, about the year 1851, are here exhibited. The bust of Juno after the antique (G. 583), 24 inches high, is an early specimen of Copeland's Parian (Fig. 108). The beautiful material termed *Parian* or *statuary biscuit*, which was invented in the Potteries nearly fifty years ago, differs from porcelain only in the employment of an easily fusible felspar instead of Cornish stone, and is fired at a temperature comparatively not high. The fabrication of figures with this biscuit requires great care and skill, the figures being cast in several portions and carefully joined together, while their bulk diminishes by firing to no less than a quarter of the size of the model. The firing itself also needs much care, props being necessary to support the figures, which



FIG. 108.

otherwise would become distorted. The pleasing tone of the body is said to be due to a small quantity of the silicate of peroxide of iron contained in the felspar or in the clays.

The specimen G. 584b is a group in white biscuit, representing two children playing with a rabbit, marked in relief—

“PUBD. BY C. BAGULEY, *Wanley*,  
*Staffordshire*. 20 JULY, 1810.”

This last figure is obscure; the date may be 1810 or 1818. It is interesting, however, to find so early a piece resembling parian in many of its characters.

The large vase G. 592 (Fig. 109) is a sample of Parian ware 34 inches high, with floral ornamentation in very high relief, manufactured by Messrs. T. and R. Boote, of Burslem. Some small portrait busts in parian, by Mr. W. H. Goss, of Stoke-upon-Trent, are excellent examples of the utilisation of this ware.

The only other piece in this case to which special attention need be called is the two-handled vase, G. 593 (Fig. 110), 31 inches high, by Messrs. Wedgwood & Sons, of Etruria. The ornament is in white relief on a dark blue ground, after the manner of old Wedgwood jasper ware.



FIG. 109.



FIG. 110,

The remaining specimens of Staffordshire ware, consisting for the most part of framed plaques, are distributed, according to the available space, over the walls in the neighbourhood of the cases containing the Ceramic Collection, partly on the eastern and partly on the western side of the Museum. The pedestal of perforated enamelled bricks (G. 605), by Messrs. Minton & Co., represented in Fig. 111, is placed between Wall-cases XXX. and XXXI.

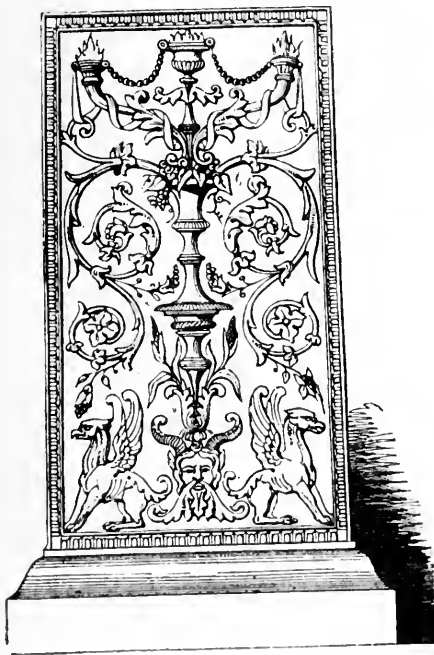


FIG. 111.

## BOW PORCELAIN.

[Wall-cases XI. and XII.]

The range of wall cases under the windows, along the southern or Jernyn-Street side of the Museum, contains a large collection of specimens illustrating the history of the manufacture of British porcelain. The series commences in Case XI., with the productions of the famous factory at Bow.

It is generally believed that the porcelain works at Stratford-le-Bow were established about the year 1730, but the earliest authentic information concerning the factory does not commence until several years later. In 1744 a sample of china clay was brought to this country from America; and, with the view of introducing this material at Bow, a patent was taken out in December of that year by Edward Heylyn, of Bow, merchant,

and Thomas Frye, of West Ham, Essex, painter, for the production of a porcelain containing, among other ingredients, "an earth, the produce of the Cherokee nation in America, called by the natives *unaker*." The Mr. Frye here mentioned, who was an artist and engraver, became manager of the Bow works, and during the subsequent partnership of Messrs. Weatherby and Crowther assiduously devoted himself to the improvement of the manufacture, but in 1759 he was compelled to abandon the employment in consequence of ill health, and in 1762 he died of consumption.

Some interesting particulars respecting the Bow factory are furnished by a document in the cover of a box in the British Museum containing a punch bowl. The writing is signed "T. Craft, 1790," and informs us that "this bowl was made at the Bow China Manufactory about the year 1760, and painted there by Mr. Thomas Craft. My cipher is in the bottom; it is painted in what we used to call the old Japan taste, a taste at the time much esteemed by the then Duke of Argyle; there is nearly two pennyweight of gold, about 15 shillings; I had it in hand at different times about three months: about two weeks' time was bestowed upon it; it could not have been manufactured, &c. for less than 4*l*. There is not its similitude. I took it in a box to Kentish Town, and had it burnt there in Mr. Gyles's kiln; cost me 3*s*. . . . The above manufactory was carried on many years under the firm of Messrs. Crowther and Weatherby, whose names were known almost over the world. They employed 300 persons; about 90 painters (of whom I was one), and about 200 turners, throwers, &c., were employed under one roof. The model of the buildings was taken from that at Canton, in China."

In connexion with the statement in this last paragraph it is interesting to notice the specimen H. 22 (Fig. 112), an inkstand which is inscribed "MADE AT NEW CANTON, 1751." It was shown by the late Mr. Chaffers that the Bow works were known in the early stages of their existence as "New Canton," and he published from the memorandum books in Lady Charlotte Schreiber's possession "A Weekly Account of



FIG. 112.

Bisket ware made at New Canton" during the first six months of 1754.

Mr. Weatherby, one of the partners in the business at Bow, died in 1762, shortly after Mr. Frye's death, and the next year John Crowther became a bankrupt, but he appears to have retained an interest in the works for some time after his failure.

In 1777 Crowther was elected into Morden College, Blackheath, and Craft, writing in 1790, says, "I am the only person of all those employed there who annually visit him." About the year 1775 or 1776 the Bow works were sold to Mr. William Duesbury, and the moulds and models were removed to Derby. The factory was afterwards converted into chemical works, and in Craft's time was used as a manufactory of turpentine.

Some interesting account books and other documents used at the old Bow works passed some years ago into the possession of Lady Charlotte Schreiber, and these records not only show the large amount of business which was at one time carried on at the Bow works, but incidentally afford much information as to the character of the ware produced.

But the most valuable information on this subject is that which was derived from the excavations at Bow in 1868, by Messrs. Bell and Black. While trenching a drain from the lucifer-match manufactory to the sewer the workmen found, at a depth of 8 or 10 feet from the surface, a number of fragments of old Bow porcelain and portions of saggars; the "find" being probably on the site of an old kiln. Some of these pieces, presented by Mr. Bell, are exhibited in this collection, and by showing the character of the Bow paste and the style of ornamentation have led to the identification of many pieces of Bow china which had previously been wrongly attributed to other manufactories. While some of the specimens brought to light by these excavations are coated with a glaze, most of them are merely in the state of biscuit, and are therefore castaway fragments of unfinished ware. Such is the specimen H. 1 (Fig. 113), which is a fragment of a cup ornamented with the embossed five-petalled flower known as the May-flower or hawthorn pattern.

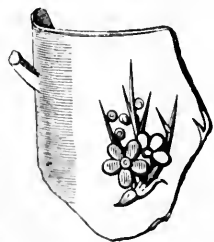


FIG. 113.

The circular disc of frit (H. 19), the roll of baked clay (H. 21), and the fragment of a sagger (H. 20) are interesting relics of the old works.

But little is known regarding the materials employed at Bow. According to Heylyn and Frye's patent, granted in 1744, one part of potash or pearl ash is mixed with one part of sand or flint and a variable proportion of "unaker." In a subsequent patent taken out by Frye alone in 1749, no mention is made of the unaker; but it is said that a "virgin earth," produced by the calcination of certain "animals, vegetables, and fossils," is mixed with flint or sand and a certain proportion of pipe-clay. The glaze is described as made of saltpetre, red lead, and sand, with the addition of white lead and smalts. Professor Church has pointed out that the earth obtained by the calcination of animal matter must have been bone-earth, and his examination of some fragments of porcelain obtained from the drainage

operations at Bow revealed the presence of upwards of 17 per cent of phosphoric acid. (*See his analysis on p. 35.*)

The various modes of decoration employed at the Bow works are well illustrated by specimens in this collection. Some of the pieces, like the sauce-boat, H. 54, are painted in blue under the glaze, and it is worth noting that many of the pieces of unglazed porcelain dug up at the works were in like manner painted with cobalt blue. There is evidence to show that as early as 1756 the managers of the Bow works availed themselves of the method of transfer-printing, and occasionally sent their porcelain to be decorated at Liverpool. The plate H. 66 is a delicate specimen of late Bow porcelain, decorated with a transfer print in red. The subject of the engraving is often found on specimens of early printed Worcester porcelain (compare N. 40*a*). The method of printing on china is generally attributed to Sadler and Green, of Liverpool, about 1750, or soon afterwards, and references to printed pieces of Bow china occur among Bowcocke's memoranda, published by Chaffers.

Among the painted and gilt pieces are several examples (H. 24 to H. 27) of the "partridge pattern," frequently mentioned in the notes of John Bowcocke. It should be remembered, however, that the same pattern is found on Worcester and on Plymouth china. Some of the finest productions of the old Bow factory were its china statuettes, of which examples are furnished by the specimens marked H. 45 to H. 48. It is known that John Bacon, the sculptor, worked at one time for Bow; and we learn from "Nollekens and his Times" that Moser, the keeper of the Royal Academy, also modelled for the Bow factory.

The figure of a female playing the *pastorella* (Fig. 114) is one



FIG. 114.

of a pair (H. 47 and H. 48), each of which is marked in red with an anchor and dagger. This mark has sometimes been

regarded as an early Chelsea mark, but most collectors now agree in attributing it to Bow, an attribution which receives some support from the capital cursive *B* which, in addition to the anchor and dagger, is marked upon the figure H. 45.

It may be remarked that at the back of each of the figures H. 47 and H. 48 near the base a square hole has been pierced before glazing, for the purpose of receiving a metal stem supporting nozzles for candles. As this square hole is said to be never found on similar Chelsea pieces, it has come to be regarded as a distinctive feature of old Bow figures.

The triangle, commonly attributed to Bow, is now considered by many collectors to be a Chelsea mark. Two small cream jugs of the famous "goat and bee" pattern, one coloured and the other plain, are exhibited as H. 33 and H. 34. These bear the mark of an incised triangle, formerly regarded as distinctive of Bow china. However, a cream mug in the possession of Mr. W. Russell, and another in the possession of Mr. T. Thornhill, both of similar paste and pattern to these pieces, bear the triangle, together with "*Chelsea, 1745*," indented in the paste. The two cream jugs here exhibited were formerly in the Strawberry Hill Collection.

The greater number of the specimens of Bow china are unmarked, and the identification has consequently to be based on the character of the body and the style of ornamentation. It should, therefore, be understood that, in the present state of our knowledge on this subject, the reference of some of the specimens in this collection to the Bow manufactory is open to revision.

#### CHELSEA PORCELAIN.

[Wall-cases XIII. and XIV.]

Although the exact date of the establishment of the porcelain works at Chelsea has not been ascertained, it was probably at least as early as 1745. The "goat and bee" cream jugs marked with an impressed triangle and dated "*Chelsea, 1745*," have been mentioned above. It has been supposed that the manufacture had even then obtained considerable importance, for the French Company, which at that time desired the exclusive privilege of establishing a porcelain manufactory at Vincennes (subsequently that of Sèvres) urged the benefit that France would gain by having works which should exclude the German and *English* porcelain. This reference, however, may have been made to the productions of Bow rather than to those of Chelsea. Be that as it may, it is known that in 1747 several persons

came from the Staffordshire potteries, and settled at the Chelsea works.\*

The late Mr. J. E. Nightingale, of Wilton, who undertook an extensive search among old newspapers with the view of discovering advertisements and other notices of early English porcelain, could find no reference to Chelsea china before the early part of 1750.† An advertisement from the "Chelsea China Warehouse, St. James's street," dated January 17, 1750, refers to the productions of "Mr. Charles Gouyn, late Proprietor and Chief Manager of the Chelsea House." At this time the works were in the hands of Mr. Nicholas Sprimont, originally a silversmith, who appears to have succeeded Gouyn at Chelsea. Probably, as Prof. Church has pointed out, both Gouyn and Sprimont were of Flemish origin.

It would appear from a memorial‡ presented to the Government that the proprietor or conductor of the works, styled "the Undertaker of the Chelsea Manufacture of Porcelain Ware," was "a silversmith by profession," who, "from a casual acquaintance with a chymist who had some knowledge this way, was tempted to a trial, which upon the progress he made, he was encouraged to pursue with great labour and expense." Unfortunately the date of the memorial is not given, but Mr. Franks has pointed out that it is certain from internal evidence that "the document was written after 1752, and probably before 1759."§ It mentions that at least one hundred persons were then employed, "of which is a nursery of 30 lads taken from the parishes and charity schools, and bred to designing and painting, arts very much wanted here, and which are of the greatest use in our silk and linen manufactures." The memorialist complains sadly of the smuggling sales of the Dresden porcelain, allowed to be imported for private use, but otherwise prohibited, pointing out "that a certain foreign minister's house has been for a course of years

---

\* "Charles Simpson, 63 years of age in 1817, was born at Chelsea, to which place his father Aaron Simpson went in 1747, along with Thomas Lawton, slip-maker, Samuel Parr, turner, Richard Meir, fireman, and John Astbury, painter, all of Hot Lane; Charles Wedgwood, of the Stocks, a good thrower, Thomas Ward, and several others of Burslem, to work at Chelsea china manufactory. They soon ascertained that they were the principal workmen on whose exertions all the excellence of the porcelain must depend; they then resolved to commence business on their own account at Chelsea, and were in some degree successful; but at length, owing to disagreement among themselves, they abandoned it and returned to Burslem, intending to commence there the manufacture of china; but soon after their return Aaron Simpson died, the design was relinquished, and each took the employment quickly offered in the manufacture of white stone-ware, then sold readily on the day of drawing the oven." — *Shaw's History of the Staffordshire Potteries*, Hanley, 1829, p. 167.

† "Contributions towards the History of Early English Porcelain, from Contemporary Sources." By J. E. Nightingale, F.S.A. (Printed for private circulation.) Salisbury, 1881.

‡ Lansdowne MSS., No. 829, fol. 21, printed at length in Marryat's "History of Pottery and Porcelain," 3rd ed., p. 373.

§ "Notes on the Manufacture of Porcelain at Chelsea." By Augustus W. Franks M.A., *Archæological Journal*, vol. xix., 1862, p. 343.



“ a warehouse for this commerce, and the large parcel advertized for public sale on the seventh of next month is come, or is to come, from thence.” It appears that this Dresden porcelain paid only eightpence by the pound when entered for private use, so that the competition established became finally very injurious to the Chelsea manufacture. The memorialist speaks of having sold to the value of more than 3,500*l.* during the previous winter, “ which,” he adds, “ is a great deal, considering the thing is new, and is of so great extent that it has been beyond the reach of his industry to produce such complete assortments as are required in a variety of ways.”

According to Faulkner's *History of Chelsea*, the Chelsea china manufactory was situated at the corner of Justice Walk, and occupied the houses at the upper end of Lawrence Street. Several of the large old houses were used as show rooms. These houses were long since pulled down, and others erected in their place. An advertisement in the *London Evening Post* of December 19, 1749, refers to property in “ Great China Row, Chelsea.” In July 1843, upon digging the foundation for Cheyne Row West, extensive remains of the Chelsea porcelain works were found, including large quantities of broken vases, figures, &c. It is believed that a smaller factory at Chelsea was also at one time engaged in the manufacture of porcelain, but its productions were probably unimportant. It is known, indeed, from Shaw's History, that certain Staffordshire potters set up as china makers at Chelsea, (see foot-note on p. 118).

In the early part of 1757, an advertisement, quoted by Mr. Nightingale, informs us that “ the Chelsea Porcelaine Manufactory has been very much retarded by the Sickness of Mr. Sprimont.” Another advertisement in the spring of 1761 announces that “ his Indisposition will not permit him to carry it on much longer”; and in a sale-notice in January 1763 he assures the public that “ it will positively be his last Sale, being unfortunately obliged, on account of his lameness, to decline carrying on the same.”

It was rumoured at one time that the manufactory would probably be purchased by the Duke of Cumberland “ that so matchless an art should not be lost.” The Duke was a great patron of the works, and it is said that he was at one time interested in the proprietorship, conjointly with Sir Everard Faulkener. A bust of the Duke of Cumberland in plain white Chelsea porcelain is exhibited as I. 1.

An advertisement in the *Public Advertiser* of January 2, 1764, re-printed by Mr. Nightingale, announces that “ Mr. Sprimont, the sole possessor of this rare Porcelaine Secret, is advised to go to the German Spaw,” and refers to the sale of the stock and plant of the works, to be followed by the sale of “ the last Produce of that once most magnificent Porcelaine

Manufactory." Towards the end of 1769 Sprimont's connexion with Chelsea was brought to a close, and early in the following year the works passed into the hands of Mr. William Duesbury, of Derby. For some time he carried on the business at Chelsea and Derby simultaneously, and the Chelsea works were not finally discontinued until the year 1784, when the available plant was transferred to Derby, whither many of the workmen and artists also proceeded. (See Derby Porcelain, p. 122.) Sprimont's death occurred in 1771.

While the sand for the Chelsea porcelain was obtained from the Isle of Wight (p. 16), and perhaps some of the clay also, it may easily have happened that the clays of Poole in Dorset were likewise employed. These clays were then well known, and would scarcely be neglected by the Chelsea manufacturers. The supposition that kaolin was actually imported from China for these works is improbable, but it may have originated from the fact that plain porcelain, according to some authorities, was imported from China to be enamelled at Chelsea. The saucer (I. 15) is supposed to support this view, since the paste appears to be oriental while the decoration is quite in the Chelsea style. Bone-ash seems to have been largely employed in the manufacture of the Chelsea porcelain, as attested by the analysis of a figure by Professor Church; given on p. 35.



FIG. 115.



The figure of a carpenter, I. 6 (Fig. 115), is an example of the simpler efforts of the Chelsea modellers; while the pair of figures, I. 5 and I. 6, illustrate the more highly decorated style. Great skill was displayed in the production of the colours employed in the decoration of the porcelain. The claret colour has been considered as the most remarkable of those employed; but some other enamels are equally good. The fine mazarine blue, is seen in the ground of the small vase, I. 19 (Fig. 116).

Some of the early pieces of Chelsea porcelain are interesting as examples of the crude character of the work in its early stages, when the technical details were incompletely mastered. Thus the plate I. 23, and the compotier I. 24, are of extremely dense paste, and the glaze is much fritted. The plate I. 29 shows the glaze accumulated round the base in "tears;"

whilst in most other specimens these inequalities have been removed by the rim having been ground smooth. It may also be observed that many of these early pieces exhibit on the back three strongly-defined marks produced by contact with the supports on which they rested during firing. These stilt-marks are seen, for instance, on the tureen and plateau, I. 46. Defects in the paste or in the glaze were in many cases concealed by having sprigs of flowers painted over them; this artifice is illustrated by many specimens, such as the plate I. 30.



FIG. 116.

As regards marks, the earliest pieces of Chelsea porcelain do not appear to have had any. The embossed oval with raised anchor upon it  is generally considered to be an early mark, though it has been suggested that it may be also attributed to Bow. The general Chelsea mark was the anchor  either gilt or painted over the glaze, commonly in red. Two anchors were sometimes employed. The anchor and dagger is now generally regarded as a Bow rather than a Chelsea mark, whilst the incised triangle may have been used at both manufactories.

Mr. R. W. Read, of Salisbury, has pointed out that the gilt anchor was probably not used until a rather late period, and that collectors are not justified in regarding it as the mark of a superior quality of porcelain.\* The trade mark appears to have harmonised with the character of the decoration, and the profusely gilt specimens may always be referred to a somewhat late period of manufacture. An advertisement of an auction in 1760 states that there will be included in the sale "for the approbation of the Connoisseur, a few pieces of some new Colours, which have been found this year by Mr. Sprimont, the Proprietor, at a very large Expense, incredible Labour

\* "A Reprint of the Original Catalogue of one year's curious productions of the Chelsea Porcelain Manufactory," with Introductory Remarks by Raphael W. Read, F.R.C.S. (Salisbury, 1880.) This catalogue refers to a 16 days' sale at Ford's Auction Rooms in the Haymarket, in March 1756. The sale comprised 1,680 lots, composed of more than 6,500 pieces; yet this is described as the production of a single year! Only 100 copies of the catalogue were re-printed, and these only for private circulation.

“ and close Application, all highly finished, and heightened  
 “ with the gold peculiar to that fine and distinguished Manu-  
 “ factory, which makes this Porcelain the most beautiful and  
 “ magnificent ever seen, and cannot be made at any Foreign  
 “ Manufactory.”

### DERBY PORCELAIN.

[Wall-cases XV. to XIX.]

Long before the celebrated porcelain factory was established at Derby, there existed at Cockpit Hill an extensive pottery generally known as “The Derby Pot Works.” Nothing appears to have been ascertained about the foundation of these works, but it is known that they continued in operation up to the time of the bankruptcy of the proprietors, Messrs. John and Christopher Heath, in 1780. Although earthenware was the staple manufacture at Cockpit Hill, it appears that porcelain was made to a limited extent.

According to tradition, the earliest examples of china produced in Derby were small figures of animals and other ornaments, manufactured by a foreigner in Lodge Lane about the year 1745.

The late Mr. Llewellyn Jewitt believed that this foreigner was Andrew Planché, the son of a French refugee; but the early history of the Derby works is in every way obscure, and the story about the foreigner—which seems to have been derived from Samuel Keys, “one of the old Derby hands,” who was apprenticed at the works in 1785, and lived until 1850—may after all have had but slender foundation. Very few new facts regarding the origin of the Factory could be obtained by the late Mr. John Haslem, when collecting materials for his history.\*

William Duesbury, whose name figures so prominently in connexion with Derby China, was born at Longton in the Staffordshire potteries, and worked when young as an enameller. Mr. Nightingale believed that Duesbury had a share in establishing, or reviving, the manufacture of porcelain at Langton Hall. It appears that his connexion with Derby has not been clearly traced to an earlier date than 1756, though it has been said that he commenced the production of china there as early as 1750. At first his efforts appear to have been confined to the manufacture of small figures, smelling-bottles, and other trivial objects, but he soon extended his business by the production of useful ware. The works were situated on the Nottingham Road, beyond St. Mary’s Bridge. Gradually the business developed, and in 1766 Mr. Duesbury was led, as previously stated

---

\* “The Old Derby China Factory; the Workmen and their Productions.” By John Haslem. London: George Bell & Sons, 1876. See also “The Pottery and Porcelain of Derbyshire.” By Alfred Wallis and Wm. Bemrose, jun. 1870.

(p. 120), to purchase the Chelsea works. The two establishments being thus united under one proprietor, the Chelsea anchor was associated with the letter *D*, as the initial of either Duesbury or Derby, and the porcelain bearing this composite mark *℞* became known as "Chelsea-Derby." When the Chelsea works were finally abandoned, the moulds and models were transferred to Derby, and it is believed that at least a portion of the plant from Bow was also transported thither. Some of the best workmen and artists from both Chelsea and Bow are well known to have settled at Derby.

Examples of Chelsea-Derby china, bearing the mark in gold, are furnished by the specimens exhibited as J. 1 to J. 9. Fig. 117 represents a characteristic piece (J. 2) painted with flowers, and having a deep blue border enriched with a gilt running ornament.




FIG. 117.

Upon the decease of Mr. William Duesbury, in 1786, his eldest son carried on the Derby porcelain works for many years, in partnership during part of the time with Mr. Michael Kean, an Irishman of some reputation as an artist. After the death of the second Mr. William Duesbury, which occurred about the year 1796, the business was managed by Kean, assisted by a third William Duesbury. Eventually the business was thrown into Chancery, and it ultimately became the property of Mr. Robert Bloor, who had been clerk to the firm of Duesbury and Kean. Though possessing good capacity for business, he was not, like his predecessors, gifted with artistic taste, and the works consequently degenerated under his management. Mr. Bloor, after a long illness, died in 1846, and the old factory was pulled down about this time. After its demolition, a nunnery was built upon the site, but this in turn was destroyed in 1863. After Bloor's death the Derby china business passed into the hands of Mr. Thomas Clarke, who soon sold it to Mr. Samuel Boyle, of Fenton, and in 1848 the concern was closed, the stock and plant being removed the following year to Staffordshire.

There is much uncertainty respecting the materials at first employed at the old Derby porcelain works. It is not improbable, however, that they were almost the same as those employed at Chelsea, seeing that Derby owed much of its importance to the acquisition of workmen from Chelsea and Bow. The Bideford clay was probably known at Derby even when the works were first established, as that clay was then much used in the Staffordshire potteries, and the ware made with it was in great

demand between 1730 and 1741. At one time the Derby works obtained clay from a lead mine at Brassington, but its use was soon given up. The Cornish kaolins and china stones, which became well known to the potters, especially after their introduction into the Staffordshire potteries about 1777, appear to have been employed in the Derby works towards the end of the last or beginning of the present century.

After the Chelsea-Derby, or Chelsea-Duesbury mark, previously noticed, the earliest known Derby mark is that of the initial *D* surmounted by a crown, in allusion to the royal patronage with which Duesbury was first favoured about 1773. This mark is found, in slaty blue, on the cup and saucer J. 9. At a latter date about 1788, the second Duesbury added the cross batons with three dots in opposite angles, thus completing the well-known "Crown-Derby" mark . In the early Crown-Derby pieces

the mark is generally executed in puce or lilac, and the crown is carefully jewelled or dotted; in latter times it degenerated, and in 1831 it was discontinued. A good example of the early puce mark is seen on the covered cup and saucer, J. 24, represented in Fig. 118.

The late Mr. John Haslem, the historian of the Derby factory, took great interest in the collections in this Museum; and being

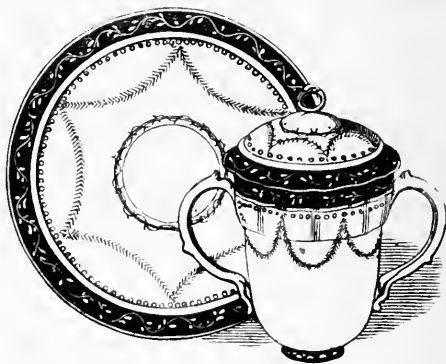


FIG. 118.

anxious that, so far as Derby was concerned, they should be thoroughly illustrative, he greatly aided the curator in securing characteristic acquisitions. It is therefore believed, that the series contains types of all the successive phases of the manufacture.

The biscuit figures of Diana and Mars (J. 43 and 44) are good examples of the artistic statuettes for which the factory was at one time distinguished. The beautiful material in which they are cast is said to have been first used by Kean; but in later days the figures were made in a harder body, similar to that of ordinary china. John Mountford, one of the Derby figure

makers, in endeavouring, many years afterwards, while in the employment of Copeland's, to imitate the old Derby biscuit, the recipe for which was lost, was led to the discovery of Parian ware.

Several examples of china figures, painted and gilt, are exhibited. While some were, no doubt, modelled at Derby, others were probably merely cast there in moulds brought from Chelsea and Bow; such, for instance, would be the case with the well-known figure of Quinn as Falstaff (J. 49).

A large double-handled tureen, marked J. 91, placed on account of its size on the top of Case XIX., offers an excellent illustration of the clever flower-painting of William Pegg, the Quaker, whose rather remarkable career has been narrated by Mr. Haslem.

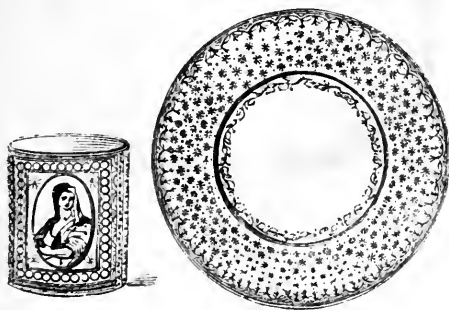


FIG. 119.

The delicate little coffee can and saucer, J. 35 (Fig. 119), were painted by Banford. The other Derby painters represented in the collection are Boreman (J. 57), Steele (J. 62), Askew (J. 67), Billingsley (J. 71 and 71*a*), Webster (J. 88), John Hancock, jun. (J. 41), and John Haslem (J. 84, 85, and 86). Mr. Haslem subsequently acquired great reputation as a miniature painter, and the delicacy and finish of his work are well seen in these specimens.

Much of the Derby china was decorated in what was known as the "Japan style," and several examples of the richest of these patterns are here exhibited. The pattern on J. 60 was termed "Old Japan"; that on J. 60*a* "Witches' Japan"; on J. 60*b* "Rock Japan"; on J. 60*c* "Grecian Japan"; and on J. 93 (Wall-case XXXVI.) "Exeter Japan."

Perhaps the finest piece of Derby porcelain in the collection is the large "King's Vase" J. 92 (Fig. 120), which, in consequence of its size, is placed on the top shelf of Case XXXV. This handsome vase received its name in consequence of its having been originally modelled by the Derby workpeople for presentation by them to William IV., to celebrate the passing of the Reform Bill of 1832. It was decided, however, by the Ministers of the day that the King could not accept any expression of

political sentiment, and consequently the presentation was never made.



FIG. 120.

There seems no doubt that many of the Derby patterns were inspired by Sèvres models. The bottle J. 14 is marked in blue with a jewelled crown, the letter D, and two crossed L's in imitation of Sèvres. Other pieces, such as the figures J. 12 and J. 13, are marked in blue under the glaze with crossed swords in imitation of Dresden. On much of the late Derby china the marks are printed: the pieces J. 21 to 23, for instance, being thumb-printed in red, with a crown and the letter **D**. Others are printed with the name of Bloor, or of the subsequent proprietors.

On the closing of the old Derby china works in 1848, a small manufactory was established in King Street, Derby, by Mr. William Locker, who had for many years been manager to Bloor. In this enterprise Locker was associated with several others from the old factory. From time to time changes were made in the partnership, the last survivor of the original partners being Mr. Sampson Hancock. In 1877 new and extensive works were established on the Osmaston Road, Derby, by Mr. Edward Phillips, of Worcester, for the "Derby Crown Porcelain Company."



## PINXTON PORCELAIN.

[Wall-case XIX. ; bottom shelf.]

A manufactory of porcelain was established at Pinxton, near Alfreton, in Derbyshire, about 1795, by Mr. John Coke, who secured the co-operation of William Billingsley, the flower painter from the Derby works. Under Billingsley, who was not only a good artist but a practical potter, a fine transparent paste was produced, greatly resembling that which was afterwards made at Nant-garw. It is probable that Billingsley did not remain at Pinxton more than four or five years, and that he took with him his receipts for the body and glaze, as the porcelain subsequently made was of an inferior quality. Billingsley's receipts are in the possession of Mr. Hancock, of Worcester, and were published by Mr. Haslem. The following is the formula for the Pinxton body:—"Lynn sand, 60 lbs.; bone, 40 lbs.; 5 lbs. potash dissolved in water, and the whole mixed together and made into bricks and fritted in the biscuit kiln, afterwards ground and mixed with Cornish clay in proportion to suit your mind."

After Billingsley left Pinxton the works were conducted for some time by Mr. Coke alone, and they afterwards passed into the hands of Mr. Cutts, a painter, who subsequently settled in Staffordshire. The Pinxton works were closed about 1812, but their site is still known as "Factory Square" and "China House Square." It is believed that generally no mark was used at Pinxton, but a cursive *P* is sometimes found. This mark occurs on the mug and saucer, J. 96.

The plate J. 94 illustrates the character of the ware produced at Pinxton under Billingsley's management; while the dish, J. 95, shows the nature of the china subsequently manufactured there. Both pieces are unmarked.

## PLYMOUTH PORCELAIN, &amp;c.

[Wall-cases XX. and XXI.]

The earliest production of hard-paste porcelain in this country seems undoubtedly to have been due to the enterprise and ability of Mr. William Cookworthy, of Plymouth. Cookworthy, who was a member of the Society of Friends, and in the latter part of his life an eminent minister of that society, was born at Kingsbridge, in South Devon, in 1705. In early life he was in business as a wholesale chemist and druggist in Notte Street, Plymouth, at first in partnership with a Mr. Bevans, his former employer, and afterwards with his brother Philip Cookworthy. While in business, William Cookworthy acquired considerable reputation for his chemical knowledge, and it was this knowledge

which appears to have induced him to direct his attention to the manufacture of porcelain, especially after the Père d'Entrecolles, who in 1712 resided at King-te-chin, a famous locality for porcelain works in China, had made known the materials employed, specimens of which had been sent to Paris in 1727-29.

In a letter to Mr. Hingston, of Penryn, in Cornwall, dated 30th May 1745, Cookworthy mentions that a person from Virginia had discovered both kaolin and petuntse there, and had made from these materials certain specimens of porcelain, which he showed to Cookworthy. Whatever the value of the information may have been, the letter shows that Cookworthy had his attention directed to the materials for the manufacture of porcelain at that time.\*

Mr. Prideaux infers that the discovery of the kaolin and china-stone of Cornwall may have taken place about 1755.† But Mr. R. N. Worth, a more recent writer, is disposed to place it not later than 1750.‡ Cookworthy had evidently searched the country in different directions, with the view of discovering these materials, for Borlase, writing in 1758, mentions his researches in the parish of Breage, and Mr. Prideaux quotes information received from Mr. Martin, of the St. Austel Blowing House, to the effect that Cookworthy discovered porcelain-granite in the tower of St. Columb church, which was built of that granite, from St. Stephens.

Cookworthy's first discovery of the china-stone seems, however, to have been made at Tregonning Hill, near Breage, where also he found abundance of the china-clay, which he termed "caulin." Subsequently he discovered "immense quantities both of the petunse stone and the caulin" in the parish of St. Stephens, nearer to Plymouth, and where it might be "more commodiously and advantageously wrought."

Having discovered the necessary raw materials in various parts of Cornwall and Devon, and having experimented on their utilisation, Cookworthy, in conjunction with Lord Camelford,§

\* The following is an abstract from this letter:—

"I had lately with me the person who has discovered the *China earth*. He had with him several samples of the china-ware, which I think were equal to the Asiatic. It was found on the back of *Virginia*, where he was in quest of mines; and having read Du Halde, he discovered both the *petunze* and *kaolin*. It is this latter earth which he says is essential to the success of the manufacture. He is gone for a cargo of it, having bought from the Indians the whole country where it rises. They can import it for 13*l.* per ton; and by that means afford their china as cheap as common stoneware; but they intend only to go about 30 per cent. under the company." He then proceeds to express no very high opinion of this person, and it will be observed that "samples of the ware" were shown, while no mention is made of actual specimens of kaolin and petuntse.

† "Relics of William Cookworthy," 1853, p. 4.

‡ "William Cookworthy and the Plymouth China Factory." By R. N. Worth, F.G.S. *Rep. and Trans. Devonshire Assoc.*, vol. viii., 1876, p. 480.

§ The following letter from Lord Camelford to Mr. Polwhele (History of Cornwall), dated Boconnoc, November 30, 1790, is important on this subject:—"With regard to the porcelain manufactory that was attempted to be established some time ago, and which was afterwards transferred to Bristol, it was undertaken by Mr. Cookworthy, upon a friend of his having discovered on an estate of mine in the parish of St. Stephens a certain white saponaceous clay, and close by it a species of granite or moorstone, white with greenish spots, which he immediately

established works at Plymouth for the manufacture of porcelain of hard paste, and in 1768 took out a patent for the manufacture.\*

The porcelain is described as composed of "moorstone" or "growan" and "growan clay," that is, of porcelain-granite and china-clay, the stone giving the ware "transparence and mellowness," and the clay imparting "whiteness and infusibility." The two ingredients were used in about equal parts. After being baked to the condition of biscuit, the china was glazed by means of china-stone, the best stone for this purpose being, according to Cookworthy, a solid variety "stained with abundance of greenish spots," occurring at Tregonning Hill. This made "an excellent glaze, without the addition of vitrescent ingredients"; but in other cases he added to the levigated stone a proper proportion of "lime and fern ashes, or an earth called magnesia alba."

For the decoration of the ware, Cookworthy is said to have engaged an excellent painter from Sèvres, named Soqui, Lequi, or Le Quoi.† It has also been generally stated that Henry Bone, the celebrated enameller, worked when young at Cookworthy's factory; but doubt has been thrown on this statement by Mr. Hugh Owen.

Much discussion has arisen as to the site of the Plymouth china-factory. According, however, to Mr. Worth, who has very carefully examined this question, there can be little doubt that the china was made in some old premises "on the eastern side of High Street, immediately to the north of Vintry Street."‡ From 50 to 60 people were engaged there; and the demand for the blue and white porcelain is said to have been considerable. The fuel seems to have been chiefly wood.§

As the works at Plymouth, though successful as a manufacture, did not prove commercially remunerative, they were closed about the end of 1771, and the manufacture was transferred to Bristol, where it had been previously carried on by Richard Champion under the style of Cookworthy & Co. Champion finally purchased all interest in the Plymouth patent in October 1773, and the legal transfer was effected in the following year.

Mr. Cookworthy, after closing his connexion with the manufacture of porcelain, appears to have devoted his remaining years

"perceived to be the two materials described by the missionary Père d'Entrecolles, "as the constituent parts of the Chinese porcelain, the one giving whiteness and body to the paste, the other vitrification and transparency. The difficulties found in proportioning properly these materials, so as to give exactly the necessary degree of vitrification, and no more, and other niceties with regard to the manipulation, discouraged us from proceeding in this concern, after we had procured a patent for the use of our materials, and expended on it between two and three thousand pounds. We then sold our interest to Mr. Champion, of Bristol." The discovery of the china-clay and china-stone was made by Cookworthy himself, and not by "a friend of his."

\* Specifications of Patents, No. 898, March 17, 1768.

† See Owen's "Two Centuries of Ceramic Art in Bristol," p. 89.

‡ *Rep. and Trans. Dev. Assoc.*, vol. viii., 1876, p. 494.

§ Burt's "Review of Plymouth" (1816) as quoted by Pridoux in his "Relics of Cookworthy," p. 5.

until his death, which occurred at Plymouth in 1780, at the age of 76, to his duties as a minister in the Society of Friends.

Undoubted specimens of Plymouth porcelain have become extremely scarce, but the Museum possesses many authentic pieces.

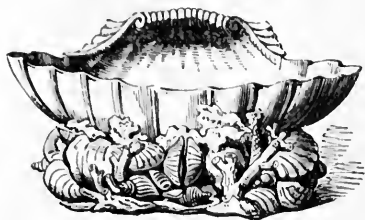


FIG. 121.

Thus the salt-cellars, in form of valves of *Tridacna*, mounted on a base of coral and shells (K. 1 and 2, Fig. 121), though unmarked, are undoubtedly early specimens of this porcelain. They are known to have been originally in the possession of

a person who was directly connected with the old Plymouth works, from whom they passed to the donor, Mr. Williams, a member of the same family. Similar forms are believed to have been made at Bristol and at Bow.

The mark, when one was used, is  $\text{Al}$ , the alchemic symbol for tin (Jupiter), and probably adopted in allusion to the stanniferous character of that portion of country where the raw materials were obtained.

The mug (K. 9, Fig. 122), bears this mark in brown, while another mug (K. 8), is similarly marked in gold; both these specimens were presented many years ago by Earl Morley. On some other pieces, as K. 16 and K. 18, the mark is in blue.



FIG. 122.

It appears that earthenware, or delft, was also at one time manufactured at Plymouth. It is difficult to identify the ware, but two pieces in the collec-

tion (K. 19 and K. 20) presented by Montague E. Parker, Esq., are believed to be genuine. The plate (Fig. 123) bears the



FIG. 123.

crest of the Parker family, and it is said that it was made locally for an ancestor of the donor.

### BRISTOL PORCELAIN.

It has been asserted that the manufacture of porcelain in Bristol was not commenced until the transfer of Cookworthy's patent to Champion in 1773; but, independently of the fact that the latter began to make porcelain in 1768, as soon as the patent in which he had an interest was obtained, there is a still earlier attempt referred to in Champion's correspondence.\* Mr. Caleb Lloyd, residing at Charlestown, S. Carolina, in November 1765, sent a box of kaolin to Bristol, to be forwarded to Lord Hyndford, who was a relative of both Champion and Lloyd. The result of the experiments on it was related by Champion to Lord Hyndford, under date of 28th February 1766.

"My Lord,—The difficulties which I have had in the trial of the South Carolina clay prevented my acknowledging the receipt of a letter which your Lordship did me the honour to send me. Mr. Goldney declined it for want of conveniences, but expressed his obligations for your Lordship's obliging message. *I therefore had it tried at a manufactory set up here some time ago, on the principle of the Chinese porcelain; but not being successful is given up.* The porcelain of the Chinese is composed of the kaolin (or clay) and the petuntse (a stone), both found generally together. The proprietors of the work in Bristol imagined they had discovered in Cornwall all the materials similar to the Chinese; but though they burnt the body part tolerably well, yet there were impurities in the glaze or stone, which were insurmountable, even in the greatest fire they could give it, and which was equal to a glass-house heat. The experiment of the Carolina clay promised well as far as the clay would permit, and was found to be much purer than their own, but there not being any stone to try with it, a complete trial could not be made. I have sent some to Worcester, but this and all the English porcelains being composed of frits, there is no probability of success."

At what period these experimental works were begun and by whom conducted there is no clear record, but Mr. Worth has sought to prove that Cookworthy's earliest attempts to establish a manufactory of hard porcelain were made at Bristol prior to January 1764.†

Richard Champion began to make porcelain in 1768, and in the "Worcester Journal" of 22nd March 1770 advertised for workmen:—"China ware painters wanted for the Plymouth New

\* For the greater part of these notes we are indebted to Mr. Hugh Owen, F.S.A., the historian of the Bristol China Factory.

† *Rep. and Trans. Devonshire Assoc.*, vol. viii., 1876, p. 496.

" Invented Porcelain Manufactory. A number of sober, ingenious artists, capable of painting on enamel or blue, may hear of constant employment by sending their proposals to Thomas Frank, in Castle Street, Bristol."\*

The exact locality of the china works before 1771 has not been traced. The premises, afterwards occupied as a china factory, and now known as No. 15, Castle Green, were rated in September 1773 to William Cookworthy & Co.

In October 1773, the patent right passed into Champion's sole name, and from September 1773 to September 1780, the premises were rated to Richard Champion & Co.; in 1781, to Richard Champion only; and they then passed into the occupation of J. Carey, pipe maker. It will be observed that the Bristol china works were carried on for many years longer than the period formerly ascribed to them.

Simeon Shaw† gives a very circumstantial account of the transfer of Champion's patent by sale to a company of Staffordshire potters in 1777, but the date is erroneous. Sarah Champion, sister to the potter, who kept an elaborate journal, as well as copies of her letters, wrote, under the date of 14th January, 1781:—"My brother being obliged to expend a month or two in Staffordshire on account of the china manufactory;" and again on the 9th June following: "My brother, who with my sister C. returned the 4th of this month from London, on their way from Staffordshire . . . intending for some time to come to make Newcastle, in Staffordshire, the place of their residence; he being in a way of profitably disposing of the china manufactory, reserving a part to himself." This agrees with the records of the Bristol poor rates, wherein the china manufactory is assessed to R. Champion for the rate made in advance in September 1781.‡

Champion had a warehouse in London, at No. 17, Salisbury Court, Fleet Street, for the sale of his porcelain, and the agent was Mr. Joseph Hancock.

\* A reduced facsimile of Champion's enamelling kiln, with memoranda in his autograph, dated October 1770, will be found at p. 19 of Mr. Hugh Owen's "Two Centuries of Ceramic Art in Bristol."

† In 1777 he sold the patent to a company in Staffordshire. Mr. Samuel Hollins, red china potter of Shelton; Anthony Keeling, son-in-law of Enoch Booth, potter, Tunstall; John Turner, Lane End; Jacob Warburton, son of William Warburton, of Hot Lane; William Clowes, potter, of Pert Hill; and Charles Bagnall, potter, Shelton. After this agreement, Mr. Champion directed the processes of manufacture for the company, at the manufactory of Mr. Anthony Keeling, at Tunstall; but when that gentleman (Mr. Champion) removed to London, in 1782, a disagreement ensued among the partners; Mr. Keeling and Mr. John Turner withdrew, and they who continued together engaged as managing partner Mr. John Daniel, son of the person who introduced plaster moulds, and settled the manufactory at the New Hall, Shelton, only a short time previously erected by Mr. Whitehead, of the Old Hall, Hanley, on which account the porcelain had the appellation of *New Hall China*. Mr. Joseph Warburton was the principal gentleman to whom the potteries were indebted for this spirited introduction of the porcelain manufactory.—"Shaw's History of the Staffordshire Potteries, Hanley, 1829."

‡ During Champion's career as a china potter, he took 20 apprentices; the first was Henry Bone, afterwards an R.A. and miniature enameller to the Royal Family, who was indentured for seven years on the 20th January 1772.

When the Plymouth works were about to be discontinued, Champion entered into negotiations for the purchase of the entire interest in the patent, and the terms were long a subject of debate by correspondence. In October 1773, Sarah Champion, writing to a relative, said that a satisfactory arrangement had been made at a personal interview between Cookworthy and her brother.\*

Although the patent was vested solely in Richard Champion in October 1773, as proved by the names of Cookworthy & Co. being replaced in the poor rate of September 1773, by those of Champion & Co., the deed confirming the transfer was not executed until the 6th May 1774, Cookworthy having been prevented from visiting Bristol by domestic troubles during the interval.

Champion, having in the same year been mainly instrumental in the return of Edmund Burke as one of the members for Bristol, determined to petition Parliament for an Act to extend the period of his letters patent for 14 years beyond the original term, and Burke's energetic support justified the determination. After a long and fierce struggle with Wedgwood, who used his powerful pen and very extensive influence with his characteristic energy in opposing the Bill, it passed the Commons by a majority of 49, without amendment, although several new clauses were proposed. The struggle was renewed again in the House of Lords with even more bitterness than in the lower House. Wedgwood published several elaborate and well-written arguments against the Bill, and, supported by Earl Gower, succeeded in getting a clause inserted allowing to the trade the free use of kaolin in opaque ware; a most valuable concession, considering that Champion himself was bound by deed to pay 100 per cent. more for that raw material than his opponents. During the contest in committee of the Lords, Mr. Wedgwood urged the insertion of a clause to admit the free use of the raw materials; this was opposed by Champion, who offered instead to register a specification, which was accepted and rendered compulsory by the Act.† This specification was drawn up and lodged in the hands of the Lord Chancellor before the Bill passed, and was enrolled on the 15th September 1775. In this specification it is said that the proportions of the ingredients may vary from one part of growan clay (china clay

---

\* "I am glad I have it in my power to add that the china business which brought him (W. Cookworthy) to Bristol is settled. I hope satisfactorily to both parties, indeed I had always hoped when they met it would be so. My brother often represented to him the great injury he imagined would attend a tax for ever on a work, left it entirely to himself to make his own terms to which he promised to abide, William Cookworthy immediately determined that he would give up the perpetual claim, and fix it to 99 years, the time of lease for the clay."—(*Correspondence of S. Champion.*) The terms were severe and oppressive, as Champion was bound to pay a royalty to Cookworthy equal to the total cost of the raw materials procured from Cornish mines leased by Cookworthy.

† 15 Geo. III., chap. 52.

or kaolin) to four parts of growan stone (china stone or petuntse) to 16 of clay to one of stone. The raw materials of the glaze are said to differ in number and proportions according to will, but they may consist of "the stone or gravel aforesaid, and the clay aforesaid, magnesia, nitre, lime, gypsum, fusible spar, arsenic, lead, and tin ashes (oxide of tin)." In order to lessen the great risk incurred in firing porcelain of so hard a character, Champion, when making his commoner ware, seems to have adopted the Chinese plan of glazing over the raw body, and finishing with one firing only; and he specifies two glazes, the first a transparent one for this purpose, and the second, containing a large proportion of kaolin, which, with arsenic and oxide of tin (tin ashes), would make the rich enamel glaze that forms the covering of his statuettes, which were biscuited in the usual way, as well as his finer ware.

Professor Church thus describes the characteristic peculiarities of an example of Bristol porcelain:—

*"Paste.*—Colour, milk-white. *Fracture.*—Sub-conchoidal, slightly flaky; lustre of fractured surface, something between greasy and vitreous; under the microscope somewhat hackly, apparently compact and homogeneous. *Glaze.*—Thin, slightly bubbled, and having the hardness of fused felspar—about 6 on the mineralogical scale. *Hardness of paste.*—Extraordinarily high: is just that of quartz; 7 on the mineralogical scale. *Specific gravity* of the fragment examined, including a small amount of gilding and a thin layer of glaze, as well as 90 or more per cent. of the paste itself = 2.37.

"The cause of the hardness and other fine qualities of Champion's porcelain is explained when we turn to its analysis. It is to the very high proportion of silica present in it that its density, hardness, and durability are chiefly due. The larger the proportion of silica present the higher the temperature the paste will require and bear in the kiln, and the more compact the resulting porcelain. A broken handle of a tea-cup, authenticated as Champion's manufacture, gave, after the removal of the glaze, the following results as the mean of two careful analyses:—Silica, 62.92; alumina, 33.16; lime, 1.28; alkalis, 2.64; total 100.00.

"It will be seen that the alkalis and lime of the Bristol porcelain do not together amount to 4 per cent. This is a remarkably small amount of fluxing or fusible ingredients. The average amount of alkaline oxides in fine oriental porcelain appears to be 6 per cent., in Dresden 6.3 per cent., and in Sèvres 7 per cent. It may be safely affirmed that few, if any, hard porcelains have ever been made with so little alkaline matter as this porcelain of Bristol. And when we come to soft English porcelains we often find no less than 33 per cent. of alkaline matters, bone-earth, and fluxing salts, and only 40 per cent. of silica, and 25 of alumina."



Many pieces in the Collection show the characteristic mark of the Bristol factory—a cross painted in blue, and in many cases accompanied by a number. A sauce boat, L. 19a, decorated in blue, is marked in relief “Bristol.” The cross-swords of Dresden were occasionally imitated, as on the coffee-pot L. 8, which bears the mark represented in Fig. 124.



FIG. 124.

The numbers accompanying the marks on Bristol porcelain are believed to refer to the painters. These numbers range from 1 to 24, but it is difficult to appropriate them to the several artists who used them. Mr. Hugh Owen believes, however, that No. 1 was used by Henry Bone, the celebrated enameller. He was born at Truro in 1755, and apprenticed to Richard Champion at the Bristol china works. “There is no doubt,” says Mr. Owen, “that the best painting executed at Castle Green was from Bone’s pencil.” The beautiful covered basket and stand, L. 11, is marked with the figure 1, in addition to the cross, and was doubtless decorated by Bone.

The sugar-basin, L. 2, and several other specimens in the collection, will serve to show the spiral ridges so well known to collectors of Bristol porcelain. Mr. Hugh Owen says that “one of the distinguishing characteristics of Bristol porcelain, which also marks the Plymouth ware, but in a greater degree, is the series of spiral ridges, often to be observed on the surface of thrown ware when held in reflected light. The difficulty of preserving a uniform density in the clay of any vessel raised on the wheel by spiral action must be obvious. The hands of the workmen are dipped in water from time to time whilst raising a vessel on the potter’s wheel, and thus certain proportions of thrown ware acquire an unequal hygro-metric condition. In the subsequent process of drying and firing those parts that have imbibed the most moisture shrink in proportion more than the denser parts. As a natural consequence, the moister layers of the clay being in the direction of the throwing or spiral, the whole vessel, without any change of form, has a spiral action imparted to its molecules in the reverse direction to that given to them on the wheel.”

Richard Champion left Bristol on the 5th November 1781, and up to the 8th April 1782, superintended the works of the china company in Staffordshire, to which his patent right had been transferred. On the 9th April Edmund Burke, who had accepted the office of Paymaster of the Forces, appointed his son, Richard Burke, and Richard Champion joint-deputy paymasters-general. On the 31st July the death of the Marquess of Rockingham brought a change of Ministers, and Champion lost his appointment. He regained it on the 16th April 1783, under the famous Coalition Ministry, only to resign it finally on the 6th January 1784, when that Administration collapsed. On the 7th October 1784 he left England for South Carolina, where at a

farm called Rockybranch he carried on the usual business of a planter. He was appointed master in equity for the district of Camden, in those days embracing a large scope of country, and was elected a member of the Assembly. He died of fever on the 7th October 1791, and was buried just outside the town at Camden.

### BRISTOL DELFT AND EARTHENWARE.

[Wall-cases XXI. to XXIII., bottom shelf.]

The art of Pottery in this city has claim to great antiquity. The governor of Bristol Castle under Edward I. in his accounts, preserved in the Pipe Roll for the twelfth year of that reign (1284) has an item—"pro terra fodienda ad vasa fictilia facienda." Extensive works must have existed along the whole bank of the river from Bristol Bridge to Redcliffe pit, at a period beyond history, as shard heaps are found wherever excavations have been made on that line. The earliest record that has been discovered of a master potter's name is in the register of the Society of Friends, wherein Thomas Frank, gallipot-maker,\* is recorded as having been married in 1697. The works situated on Redcliffe bank, were carried on by the family, for the manufacture of Delft ware, till 1777, when they were removed to No. 9, Water Lane, the premises occupied at this moment as the Bristol Pottery.

"Richard Frank & Son, earthen and stone pot works, are removed from Redcliffe Backs to Water Lane, where they continue the same business in all its branches."—*Felix Farley's Journal*, January 2, 1777.

The plate, L. 20 (Fig. 125), presented by the late Mr. William

Edkins, of Bristol, was painted by Michael Edkins, the grandfather of the donor, at Richard Frank's factory on Redcliffe Back. The initials on the reverse (Fig. 126) are those of Michael and Betty Edkins.



Fig. 125.

**E  
M & B  
J760**

Fig. 126.

\* Professor Church has critically examined a small gallipot of delftware found near the site of Frank's pottery:—A buff coloured body nearly completely covered with a stanniferous enamel. The body is hard, denser, and a trifle redder and darker in

On the wall, between Cases X. and XI., is a frame of sixteen delft tiles, painted in blue with a view of Redcliffe Church, Bristol. These were made by Richard Frank, at his factory, between 1738 and 1750.

On the 20th September 1784, Mr. Joseph Ring, who had married a daughter of Richard Frank, purchased the stock and plant at a valuation of 669*l.* 1*s.* 3½*d.*; of this the wheels, tools, and trade appliances (including an old iron pot in the yard) were valued at only 10*l.* 4*s.* 6*d.* Richard Frank died, aged 73, on the 3rd April 1785, and was interred in the burial ground of the Society of Friends at Redcliffe Pit.

In June 1786, Mr. Ring commenced his preparations for manufacturing Queen's ware. Anthony Hassells, of Shelton, was engaged at a guinea a week, to assist him. Hassells had been in business, and Mr. Ring purchased his stock on hand, some one hundred and forty-eight dozens, and paid him 5*l.* 5*s.* for the cost of his journey to Bristol—3*l.* 14*s.* 6*d.* for the expenses of workmen who accompanied him—and 5*l.* 5*s.* for "moulds." In August 1786, he was fairly at work, as the purchase of materials shows—amongst other things, "ground flints" from Bell & Griffin, of Stone, Staffordshire; and 14 pounds of sopphora [zaffre] from John Salte, London.\*

On the 9th January 1788, Mr. Ring took Messrs. Taylor and Carter into partnership under the firm of Ring and Taylor, Mr. Carter being a sleeping partner, supplying 1,500*l.* of a capital of 4,500*l.* Mr. Ring was killed by the fall of a roof whilst superintending some alterations on the 5th of April 1788, and the business was continued, with the widow as a partner, under the firm of Ring, Taylor, and Carter. In 1797 printing on ware was first introduced at the Water Lane pottery.

Ring's cream-ware is thin and well potted; the edges being remarkably sharp; and the fluted pieces very regular and well defined. It is generally yellower than either the Leeds or Wedgwood's cream-ware. Both these are coloured bodies, but Ring's has a white body, and the tint was obtained by means of a yellow glaze. The covered sugar basin, L. 22, is an example of Ring's cream-coloured ware.

tint than the body of similar Dutch wares. The body, as exposed at the upper edge of this pot, has nearly the hardness of fluor spar, or 4 on the mineralogical scale; while the body of the Dutch specimens with which it is compared is less than 3—the hardness of calc spar. The glaze, or rather the enamel of this piece, is of a distinctly greenish blue tint, very uniform in texture and colour; and a trifle more opaque than the enamel of the Dutch examples, which are distinctly inferior in quality. The surface of the enamel is slightly iridescent from commencing decomposition, owing to a long contact with the soil.

\* Mr. Ring advertised the establishment of the manufacture early in the next year:—

"Bristol Pottery, Temple Back.—Joseph Ring takes this opportunity to inform "merchants and others that he has established a manufactory of the Queen's and "other earthenware which he will sell on as low terms, wholesale and retail, as any "of the best manufacturers in Staffordshire can render the same to Bristol."—*Bristol Gazette and Public Advertiser*, for Thursday, January 18th, 1787. No. 1010.

An agreement for a new partnership at the Bristol pottery was drawn up, dated 5th April 1813, between Henry Carter, John D. Pountney, and Joseph Ring, son of the late partner. Mr. Ring, however, died at the age of 28, on the day the deed is dated, without having executed it; and Mr. Carter only continued in the firm until 1816, when he retired, and was succeeded by Mr. Edward Allies. The business was then carried on under the style of Pountney and Allies until March 1835, when Mr. Allies retired, and Mr. Pountney remained the sole proprietor.

The jug, L. 35, is stamped in small capitals on the base, "Pountney and Allies." On the specimen, L. 27, dated 1814, is a printed view of Bristol, with the Temple Church and pot works in the rear, inscribed "Bristol Pottery."

Mr. Pountney finding the business beyond his powers took Mr. Gabriel Goldney into partnership for seven years, from the 18th October 1836. At the expiration of this limited agreement it was renewed for a like period.

Mr. Goldney retired at the expiration of his second agreement, in September 1850, and Mr. Pountney was again alone. He died at Clifton in October 1852.

There was another Delft potter named Joseph Flower, whose ware was of excellent character. Many well-executed pieces, dated from 1742 to 1750, are still in the possession of a descendant, Mr. James Flower Fussell of Leigh, near Bristol. This delft is thin, neat in make, well potted, and with a good glaze.

William Fifield, the Bristol enamel painter, who was born at Bath in 1777, was apprenticed to a glass stainer, and worked at the enamel kiln of Water Lane pottery for fifty years. He died in 1857. Fifield has been described as "one of the best of the Bristol china painters, who survived many years the extinction of the manufacture." If the "manufacture" indicated is Champion's, a collation of the dates will show that Fifield was but three years old when the porcelain works became extinct. Several specimens of Fifield's work will be found in this collection, namely, the five pieces distinguished as L. 32 to L. 36.

Henry Clark, an artist of considerable ability, was originally apprenticed at the Water Lane pottery, and continued in the employ for nearly 50 years. He died about 1862. His best pieces were flowers and landscapes.

Richard Peake, a flower painter, worked at Water Lane from about 1850 to 1856.

One of the old Staffordshire family of potters, named Toft, was engaged for a short period about 1867.

Thomas Pardoe, whose name will be found on some plates well painted with flowers (as L. 37), was a glass stainer and enameller, who lived from 1809 to 1820 (with some short intermission) in Bristol, and painted, on his own account, china purchased in the white from the Staffordshire works.

---

## BRISLINGTON LUSTRE-WARE.

An example of this ware (L. 40) will be found on the lower shelf of Case XXIII., and most of the following information regarding the pottery has been obligingly furnished by Mr. Hugh Owen.

The body of the Brislington ware is hard but very coarse. It is composed of clay and sand, covered with a yellow enamel dip, and resembles delft. The peculiar character of the ware is due to the brilliant copper-lustre of its decoration, produced by the use of copper or copper sub-oxide. The ornamentation is exceedingly rude, though in some cases probably copied from the similar Hispano-Moorish ware. The manufacture was carried on by Richard Frank and his family, at Brislington, but became extinct before the end of the last century.

The late Mr. R. F. Ring remembered the Brislington works and indicated the locality. They were situated at the bottom of St. Ann's Wood, between St. Arno's Vale and the river, on a line about half a mile beyond Netham Dam; the building, afterwards occupied as a flour mill, still exists divided into tenements. The mill-pond, with its now open flood-gate, also remains. It was supplied by Brislington brook, the course of which is through the old flood-gate and over-fall, substantially built with blocks of moulded slag from the copper works. When the mill-pond, now grazing ground, was cleared out, many years ago, a large quantity of fragments of broken lustre-ware was found; in itself satisfactory evidence of the former occupation of the premises as a pottery.

The ware made at Brislington was of a common and cheap character; and soap-dishes, small plates, and shallow baking-dishes of this ware are frequently met with in farm-houses and cottages in the neighbourhood of Gloucester and Bristol.

Some doubts have been expressed respecting the existence of this peculiar manufacture in Bristol, and the numerous examples have been affiliated to Spain, in forgetfulness that a prohibitory duty on foreign ware rendered it impossible to import so common a commodity. Moreover, the Spanish ware is of a rich pale lemon colour, soft and unctuous to the touch, with rich arabesque ornaments in copper lustre, and commonly in addition, animals or birds in deep blue. The Brislington ware is much thicker and more clumsily made; wanting the smooth surface and the finer texture which characterise that of Spain; and the coating of enamel, thin and coarse, betrays to the touch an inferior manufacture. The colour, moreover, is crude, and the lustre ornaments, often mere dashes with the pencil, are poor and unartistic in form. It was burned with the coal procured from the North of England; and the expenses of this fuel, which, according to information furnished by the late Mr. Richard Ring, was 2*l.* per ton, rendering the manufacture unremunerative, the works were closed.

The Brislington copper-lustre ware works were not included in the sale of the Water Lane Pottery by R. Frank to Joseph

Ring in 1784. The book containing the inventory and particulars of the transfer of those works is in the possession of Mr. Hugh Owen.

There is evidence in proof that Richard Frank's son continued that factory after the pottery in Water Lane, Bristol, was disposed of. Richard Frank, the elder, died in April 1785; and on the 14th June following, John Williams, son of Thomas Williams, of Bristol, labourer, was indentured as an apprentice to Richard Frank, potter, and Elizabeth, his wife, for seven years. There is a memorandum appended to this record in the Book of Apprentices kept by the Bristol Corporation, that:—"On the 6th October 1789 John Williams was turned over to Elizabeth Ring, widow, for the remainder of his time." The Brislington works could not, therefore, have been closed before this; and the transfer of the apprentice probably marks the exact date of their discontinuance.

#### ROCKINGHAM PORCELAIN AND EARTHENWARE.

[Wall Case XXIV.]\*

This ware was manufactured at Swinton, near Rotherham, in Yorkshire. As early as 1757 a tile-yard and a manufactory of earthenware were established on the estate of Charles, Marquis of Rockingham, in Swinton, Wath-upon-Dearne. Mr. Edward Butler, at that time the tenant and occupier, was induced to establish the manufactory in this locality, from the circumstances of various beds of clay having been found in an adjacent parcel of ground called Swinton Common, consisting of the common yellow clay used for the purposes of making bricks, tiles, and coarse earthenware; of a finer white clay for making pottery of a better quality; of an excellent clay for making fire-bricks; and also a white clay usually called pipe-clay.

In 1765 the works became tenanted by Mr. William Malpass, who carried on the same kind of manufacture. In 1788 the works were taken by Messrs. Thomas Bingley and Co., a more opulent firm, who considerably enlarged them, and carried on an extensive trade, not only in the common descriptions of earthenware, but also in white, and blue-and-white dinner and tea services, and other wares of a superior quality. They also manufactured the brown or chocolate-coloured tea and coffee services, pitchers, &c., which obtained the name of "Rockingham ware," for which the demand was considerable. The "Cadogans," or teapots filled from an opening in the base, obtained much celebrity; two examples, M. 15 and 16, are exhibited in the

\* Convenience of space has led to the selection of this position for the Rockingham ware, although it is thus separated from the productions of the other Yorkshire potteries.

collection. The rich brown glaze of the Rockingham ware was obtained by the use of oxides of manganese and iron.

It appears that from about 1790 to 1800, the firm was known as Messrs. Green, Bingley, & Co. In 1807 the works passed into the hands of Messrs. John and William Brameld; and upon their deaths, Messrs. Thomas, George Frederick, and John Wager Brameld became the tenants. During their tenancy the works were much enlarged, and a mill for grinding flints was erected. Many improvements were introduced in the manufacture of dinner services, &c., and of useful and ornamental earthenware of every description. An example of the manufacture of the best period is furnished by the earthenware plate, M. 12, which is painted in the centre with a spray of *Dilwynia floribunda*; the botanical name being written in red on the back.

About the year 1820, Mr. Thomas Brameld directed his attention, in addition to the ordinary work, to the manufacture of porcelain of the finest description, sparing no labour or cost in bringing it to perfection; and in the painting and gilding he employed the best artists.

At these works were produced, in glazed porcelain, dinner, dessert, breakfast, and tea services, vases, groups of flowers, chimney and drawing-room ornaments, cornices, &c., all richly painted and gilt; and in plain white biscuit china, vases, flower baskets, flowers, statuettes, busts, &c. Among their various productions were a dinner and dessert service on an extensive scale, richly painted and ornamented, for King William IV.; two pattern plates for the dessert service are exhibited as M. 1 and M. 2. A vase of very large size, the property of Earl Fitzwilliam, is now in Wentworth Woodhouse.

The materials used by Messrs. Brameld in the china and porcelain works were Cornish stone and china-clay from St. Austell, in Cornwall; calcined bones, and flints from Ramsgate, Sandwich, Shoreham, and other parts of the coast of Kent and Sussex, which were ground at the works. Clay was also obtained from Wareham and other parts of the coast of Dorset.

Some beautiful examples of Rockingham porcelain are exhibited, most of which are marked with the Rockingham crest, a griffin, and are inscribed:—"*Rockingham Works, Brameld, Manufacturers to the King.*"

Some of these specimens are very richly decorated, and the cups are elaborately painted on the *inside*.

In the years 1826 and 1827 (years of great commercial difficulties) Messrs. Brameld became embarrassed, but the works were continued by them with the assistance of Earl Fitzwilliam, their landlord, till the year 1842, when they were discontinued as a manufactory either of earthenware or of porcelain.

## WORCESTER PORCELAIN.

[Wall-cases XXV. to XXX.]

According to the historians of Worcester,\* the manufactory of porcelain was established there in 1751† chiefly through the exertions of Dr. John Wall, a physician of that city, who was at once a skilful chemist and an admirable artist. The company formed to carry on the works commenced its operations in a fine old mansion, called Warmstry House, formerly the residence of the Windsor family and the Earls of Plymouth. A view of the works appeared in the *Gentleman's Magazine* for August 1752: According to Mr. Binns,‡ the earliest Worcester china was composed of a frit body; and although the old receipt known as "The True Secret of making Worcester Porcelain" is not extant, yet he believes that the following formula must be very similar to that originally used by Dr. Wall, viz., sand 120 parts; gypsum, 7; soda, 7; alum, 7; salt, 14; and nitre, 40. These materials having been fritted together, the product was crushed, and 75 parts of the frit were mixed with 15 of whiting and 10 of pipe-clay. The body thus made was coated with a glaze containing 38 per cent. of red lead, 27 of sand, 11 of ground flints, 15 of potash, and 9 of carbonate of soda. While the frit body long continued in use for the finer kinds of china, an inferior paste was formed for commoner ware by the use of steatite, which was obtained from the serpentine rocks of Mullion in West Cornwall. The frit paste was distinguished by its density and by its green colour when viewed by transmitted light, while the soap-rock body was less dense and of a yellowish colour.

As early as 1763 the Worcester porcelain seems to have been much esteemed. Thus a writer in the *Annual Register* for that year, after noticing the porcelain of Dresden and Chantillon, and classing that of Chelsea with them, considering all as more ornamental than useful, and as costly as oriental porcelain, adds, "We have indeed many other manufactures of porcelain which are sold at a cheaper rate than any that is imported, but except the Worcester they all wear brown and are subject to crack, especially the glazing, by boiling water."

In 1772 the 21 years' lease of Warmstry House expired, and the premises passed into the hands of a new company. Dr. Wall's death occurred in 1776. In 1783, Mr. Flight, the London agent for the Worcester Porcelain Company, purchased the property for 3,000*l.*, and 10 years later the firm became "Flight and Barr." On the admission of another partner in 1807, the

\* Nash's "History of Worcestershire," vol. ii. p. 124; and Green's "History and Antiquities of Worcester," 1796, vol. ii. p. 19.

† About the same date as that of the establishment of the Derby works. Probably the great success of the Chelsea and Bow porcelain about this time directed much attention to this manufacture. The Swansea pottery was established in 1750.

‡ "A Century of Potting in the City of Worcester, being the History of the Royal Porcelain Works from 1751 to 1851," by R. W. Binns, F.S.A., 1865, p. 40. A second edition appeared in 1877.




style was changed to that of "Barr, Flight, and Barr," and on the death of the elder Barr in 1813, it became "Flight, Barr, and Barr." In 1788, King George III. visited the factory, and henceforth it was termed the Royal Worcester Porcelain Works.

It appears that when the Worcester works were sold to Mr. Flight, two of the employes, Robert and Humphrey Chamberlain, left the establishment and commenced business in the town on their own account. This business was ultimately so successful as to prove a formidable opponent to the old works, and in 1840, after a long period of rivalry, the two establishments were amalgamated. Various changes in the proprietorship subsequently occurred, and in 1862 the present joint-stock company was constituted as "The Worcester Royal Porcelain Company, Limited."

The early productions of Worcester seem to have been chiefly imitations of China and Japan wares—imitations much encouraged by the high repute in which those kinds of porcelain were then held. The oriental marks were more or less perfectly copied, as may be seen on several of the specimens here exhibited, *e.g.* N. 5, 15 and 16.

The brand of a chequer or square variously fretted, bearing a general resemblance to a Chinese mark, was largely used on the early pieces; and will be found in blue on many specimens in the collection, such as N. 1,



3, 4, 6, &c. One of the earliest ordinary marks, a crescent ,

can by no means be regarded as a counterfeit, and was probably suggested, according to Mr. Binns, by one of the quarterings in the Warmstry arms. The blue crescent occurs on specimens N. 7, 8, 9, and numerous others in this series. The crescent was

not used after 1793. The letter *W* was employed at a very early date, and was probably suggested by the initial of both Wall and Worcester; it will be found on specimens N. 63, 64, 66, and 67. The crossed swords, in imitation of the Dresden mark, may be seen on N. 27, 79, and some others; while the Dresden caduceus occurs on N. 78. Many of the specimens on the lower shelves of the Worcester series, mostly blue painted ware, bear trivial figures, regarded rather as workmen's marks than as marks distinctive of the factory.

Among the finest examples of early Worcester china, the visitor should notice such specimens as the shaped flower-vase, N. 3, characteristically decorated with a painting of exotic birds; the double-handled cup, N. 6, painted with conventional foliage in the favourite Japanese style of the period; the open-work fruit basket, N. 17, richly painted and gilt; the gallon jug, N. 19, with tropical birds and butterflies; and the two-handled cup, N. 20, with the Japanese fan-pattern. Many of these specimens, and several others exhibited in this series, furnish examples of the deep mazarin-blue ground, enriched with the well-known fish-

scale pattern. The small covered jar, N. 31. slightly decorated with sprays of flowers in purple enamel, has been figured by Professor Church, who describes it as "an excellent example of the graceful yet simple forms prevalent in the best period of the Worcester works."\*

At an early date in the history of the Worcester works, Dr. Wall availed himself of the process of transferring printed engravings on to a glazed surface, and applied this art to the decoration of his porcelain. Some of the earliest specimens are delicate engravings by Robert Hancock, who had studied under Ravenet, an engraver employed at the enamel works which were established at Battersea in 1750, and where, according to Mr. Binns,† transfer-printing was first introduced. At first the designs were printed over the glaze and the printed pieces exposed only to the heat of the enamel kiln; but the invention of under-glaze printing soon followed, and the designs were then transferred to the ware when in the state of biscuit. Many examples of early printing on Worcester china will be found in the collection, but especial attention may be directed to the jug, N. 33, Fig. 127, which bears the earliest known date of Worcester printed ware, 1757.



FIG. 127.

This is a pint jug, with transfer-prints over the glaze: on one side is a three-quarter portrait of Frederick the Great being crowned by an angel with a laurel wreath, and inscribed "King of Prussia," while on the other side is an allegorical figure of Fame, and in centre a military trophy with three flags bearing the names of his victories "Reisberg, Prague, Collin; Welham, Rossbach, Breslau; Neu-mark, Lissa Breslau." The engraving is signed "RH Worcester," being the initials of Robert Hancock.‡

\* "English Porcelain," Part II., in the South Kensington Museum Art Handbooks, p. 50, 1889.

† "A Century of Potting in the City of Worcester," p. 55.

‡ A poem on the subject of this transfer-print appeared in the *Gentleman's Magazine* for December 1757, and was reproduced with slight alterations in *Berrow's Worcester Journal* for January 1758. This poem was addressed to Josiah Holdship, to whom the design of the decoration was then attributed:—

"What praise is thine, ingenious Holdship, who

"On the fair Porcelain the Portrait drew."

In justice to Robert Hancock, who was really the engraver, the following couplet was annexed to the reprint of the poem in the *Worcester Journal*:—

"Hancock, my friend, don't grieve tho' Holdship has the praise,

"'Tis your's to execute, 'tis his to wear the bays."

In a graphic description of one of these King of Prussia Mugs, from the pen of Mr. Carlyle, it is referred to as "A Mug got up for temporary English enthusiasm, and the accidental instruction of posterity. It is of tolerable China: holds a good pint, 'To the Protestant Hero, with all the Honours.'"—*History of Friedrich II. of Prussia, called Frederick the Great*, vol. vii., book xviii., cap. x.

A quart mug, N. 37, is in like manner ornamented in black transfer printing, with a portrait of the Marquis of Granby crowned by a winged figure with laurel wreath, and has a figure of Britannia on one side and of Fame on the other. The cream-jug, N. 34, and the sucrier, N. 35, are similarly decorated, with groups of figures in the Watteau style.

In the lower half of the Cases XXVIII. to XXX. will be found a large collection of blue and white china, some pieces painted and others printed, illustrating the Worcester products of various periods. The upper half of these cases contains an illustrative series of Worcester wares, of much interest in consequence of the number and variety of marks which are represented.

On the basin, the vase, and the cup, designated respectively N. 94, 95, and 96, will be found the early mark of the period when Flight became possessor of the factory—namely, the word

*Flight*, in cursive characters, and a crescent, both pencilled in

blue under the glaze. The vase, N. 100, bears an impressed mark "F. B. B." (Flight, Barr, and Barr), surmounted by a crown, indicative of Royal patronage; whilst N. 101, and several other pieces, are stamped "B. F. B." (Barr, Flight, and Barr), surmounted by a crown. The latter mark occurs on the eup and saucer, N. 104, where it is associated with the following inscription in red, "*Barr, Flight, and Barr, Royal Porcelain Works, Worcester, London House, No. 1, Coventry Street.*"

Of the work of the rival Worcester factory, conducted by the Chamberlains, several illustrative pieces are exhibited. Thus, the cup and saucer, N. 106; the scent-bottle, N. 108 (Fig. 128), with double sides, the outer one being perforated; and the covered vase, N. 109, with similar pierced honeycomb pattern, all bear the mark in red,

*"Chamberlain's Worcester."*

The plate, N. 118, has the mark bat-printed in red, "Chamberlain's Royal China, Worcester, & 155, New Bond Street, London," and a similar mark, in purple, occurs on N. 119; whilst other specimens, such as N. 120 and 121, carry the mark, "CHAMBERLAIN'S, WORCESTER," impressed in the paste. A large vase (N. 127), placed on the top shelf of Wall-case XXXVI., is painted with a figure-subject inscribed on the base, "Marguerite, the Rose Queen of Salency, Mrs. S. C. Hall." This important piece is marked in pink, "Chamberlain and Co., Worcester."



FIG. 128.

The mark used by Messrs. Kerr and Binns from 1852 to 1862 will be found on the specimens N. 111 and 126*a*. This consists of four W.'s in a circle, surrounding the figures 51 within the horns of a crescent. The W.'s refer to Worcester, and the figures to 1751, the year in which the manufacture of porcelain was established there.

The Worcester Regatta Mug for 1846 (N. 112) painted with a view of Worcester, is marked in red, "*George Grainger, Royal China Works, Worcester.*" The large vases, N. 128 and 129, with views of Worcester and Malvern, are also marked "Grainger, Lee, and Co., Worcester." Grainger's works are now under the proprietorship of the Worcester Royal Porcelain Company.

#### SHROPSHIRE POTTERY AND PORCELAIN.

[Wall-cases XXXI. and XXXII.]

One of the oldest potteries in Shropshire was situated at Jackfield, near Thurstfield, and mention of "potters from Jackfield" is said to occur as early as 1560. Some characteristic examples of the ware usually attributed to Jackfield are presented by the jugs and teapots marked O. 1 to O. 3*a*. These are composed of a rather coarse red body, coated with a brilliant black glaze, ornamented with oil-gilding. The specimen O. 2. bears a gilt inscription, "Richard and Ruth Goddin, 1769."

About the year 1751 a small pottery was established at Caughley, near Broseley, in Shropshire. Under Mr. Thomas Turner, who came from the Worcester works in 1772, porcelain of a superior quality was manufactured, and usually decorated with Chinese subjects printed in a celebrated deep blue colour. Many examples of this blue printed ware will be found in the collection, and will serve to show the close resemblance between some of the Caughley and Worcester china.

The large jug, O. 13, with a mask beneath the spout, and printed in blue with flowers, is inscribed "*James Kennedy,* 1778 ; " This piece, like many others in this series, is marked in blue under the glaze, with the letter C.

Others are similarly branded in blue with the letter S. and a few, like O. 4, and O. 4*a*, are stamped "SALOPIAN." The two-handled covered cup and saucer, O. 9, (Fig. 129) is an excellent example of Caughley ware; it is painted in blue,

enriched with gilding and marked under the glaze with the initial S.



FIG. 129.

Mr. John Rose, the founder of the Coalbrook Dale or Coalport works, was apprenticed to Thomas Turner, of Caughley, and about 1780 he commenced business at Jackfield. A few years after Mr. Rose had established his works at Jackfield, he removed to Coalport on the opposite side of the Severn. On the retirement of Turner, in 1799, Mr. Rose purchased the Caughley works, and about the year 1814 removed the business to his manufactory at Coalport; the Caughley works being then abandoned. In 1820 the Swansea and Nantgarw works were incorporated with the Coalport factory, and Messrs. Billingsley and Walker, of Nantgarw, were engaged there. About this period Mr. Rose introduced certain improvements, which gained for him the Society of Arts' gold medal (p. 56). Mr. John Rose, the founder, died in 1841, but the style of "John Rose & Co." is still retained. It is to be regretted that at one time the marks of other manufactories were imitated at Coalport. Thus the vases O. 29 and 30, though marked with C. bear also the Chelsea anchor; whilst O. 31, 32 and 33, are marked in blue with two L's crossed, after the well-known style of Sèvres porcelain.

On some specimens, as O. 36 and 37, the word "*Coalport*," is marked; and on others as O. 44 to 49, the mark is "JOHN ROSE & CO., COLEBROOK DALE, 1850."

The cup O. 57, is marked in purple with the monogram, "C. B. D." (Colebrook Dale), surrounded by inscription, "Daniell, London." The richly ornamented plate O. 50, is a specimen of the service executed by command of Her Majesty for presentation to the Emperor of Russia. It was exhibited in the Great Exhibition of 1851, and is marked in gold, "A. B. & R. P. Daniell, 120, New Bond Street, & 18, Wigmore Street."

In connexion with the ceramic productions of Shropshire, attention should be directed to the fine series of specimens of modern Majolica ware, manufactured and presented in 1871, by Messrs. Maw & Co., of the Benthall Works, near Broseley, in

Shropshire. These specimens, distinguished as O. 52 to O. 126, are placed on the upper shelves of Wall-cases XXXIX. to XLIV., where they are near the series of specimens illustrative of the modern productions of the Staffordshire potteries.

### SWANSEA EARTHENWARE AND PORCELAIN.

[Wall-cases XXXIII. and XXXIV.]

Earthenware works were established at Swansea about the year 1750, and the ware there manufactured was of much the same kind as that then produced at the Staffordshire potteries. The works, with the name of the "Cambrian Pottery," became much extended in 1790, under the management of Mr. George Haynes; and in the early part of this century he introduced a superior kind of ware, giving it the name of "Opaque China."

The earthenware figure, P. 1, is marked in brown, "*Cambrian Pottery*," whilst the vase P. 2, is similarly marked with the word "*C. A. M. B. P. T. S. A. S.*" The ewer, P. 3., with trefoil lip and gilt handle, ornamented with Greek figures in white, outlined in black printing on blue ground, is stamped "OPAQUE PORCELAIN."

In 1802 Mr. Lewis Weston Dillwyn purchased the Swansea works, and soon afterwards, by the aid of Mr. W. W. Young, the draftsman employed by him in his works on natural history, whom he had instructed in enamel painting, the opaque china became remarkable for beautiful and truthful painting of birds, butterflies, and shells, drawn from nature. Several typical pieces of this interesting ware are exhibited under the reference numbers P. 4 to 12. The covered basin, P. 12 (Fig. 130) is a very characteristic example; it is painted with butterflies, having their scientific names written on the inside (*Papilio Atalanta*, *P. Io*, *P. lucina*, *P. Argus*, and *P. Artaxerxes*). This piece is unmarked, but similar ware represented by the specimens P. 4 to



FIG. 130.

P. 8, is stamped with the word "SWANSEA," and with the letter C.

Although it would appear from passages in Donovan's "Excursions in South Wales and Monmouthshire" that a kind of porcelain was manufactured at Swansea towards the end of the last century, yet it was not until 1814 that the fine paste which obtained such repute as "Swansea porcelain" was pro-

duced. Respecting the introduction of this manufacture, the late Mr. Dillwyn afforded the following information to the director of the Museum :—

“My friend Sir Joseph Banks informed me that two persons, named Walker and Beely,\* had sent to Government, from a small manufactory at Nantgarw (10 or 12 miles north of Cardiff), a specimen of beautiful china, with a petition for their patronage, and that, as one of the Board of Trade, he requested me to examine and report upon that manufactory. Upon witnessing the firing of a kiln at Nantgarw, I found much reason for considering that the body used was too nearly allied to glass to bear the necessary heat, and observed that nine-tenths of the articles were either shivered, or more or less injured in shape by the firing. The parties, however, succeeded in making me believe that the defects in their porcelain arose entirely from imperfections in their small trial-kiln, and I agreed with them for a removal to the Cambrian pottery, at which two new kilns, under their direction were prepared. While endeavouring to strengthen and improve this beautiful body, I was surprised at receiving a notice from Messrs. Flight and Barr, of Worcester, charging the parties calling themselves Walker and Beely with having clandestinely left an engagement at their works, and forbidding me to employ them.”

An excellent body was finally obtained at Swansea, and as might be expected, the natural history subjects painted upon it were most carefully executed. The hoopee painted on the plate P. 21, may be cited as a fair example. The manufacture was not, however, long continued. Other occupations engaging the attention of Mr. Dillwyn, the manufacture of porcelain was laid aside in 1817, and earthenware again became the sole product of the Swansea pottery, until about the year 1820, when the works were discontinued, and the appliances, having been purchased by Mr. Rose, were removed to Coalport.

The North Devon or Bideford clays seem to have been early employed at the Swansea works, as also the Dorset or Poole clays. Cornish kaolin and china-stone likewise formed a portion of the porcelain body. Steatite, from veins in the serpentine of the Lizard, Cornwall, was also employed during the manufacture of the porcelain. Flints were obtained chiefly as ballast in trading vessels and colliers, from the chalk districts of the south and south-east of England.

As regards marks, Mr. Dillwyn said that “the articles made at and marked ‘Swansea’ include all, I believe, which have a more compact fracture, and the addition of a trident denotes a supposed improvement, which was ultimately not found to answer.”

---

\* *Beely* was a corruption of *Billingsley*, the name of Walker's father-in-law.

The word "*Swansea*," painted in red, occurs on the specimens P. 21 to 23, 28 and 29; whilst the impressed mark, "SWANSEA," and a trident, will be found on the plates P. 24 to 26. The little vase, P. 21, which with many other specimens was presented by Mrs. Dillwyn, is of the same body or paste as the specimens of Nantgarw porcelain, and was an experimental piece made on trial, in 1814 or 1815, to render the body more durable.

---

#### NANTGARW PORCELAIN.

[Wall-case XXXIV.; upper shelves.]

In 1813 a porcelain manufactory was established at Nantgarw, near Cardiff, by William Billingsley and his son-in-law, George Walker, who have been already mentioned in connexion with the Swansea porcelain. Billingsley was a clever china painter, who had worked at Derby and at Worcester, and who before coming to Nantgarw had assumed the name of Beely. The small capital of the founders of the Nantgarw factory was soon exhausted; and money was then advanced by Mr. W. W. Young, already mentioned as a painter at the Swansea works. An interesting letter contributed by Mr. Young to *The Cambrian* newspaper of October 19, 1822, has been unearthed by Mr. W. Turner\*; and from this letter we learn the brief history of the Nantgarw factory. It appears that as sufficient capital was not forthcoming, the work at Nantgarw was taken over by the proprietors of the Swansea pottery. Owing, however, to disagreement, Billingsley, who is described as being a man of violent temper, soon left Swansea and returned to Nantgarw, where by the assistance of several patrons he struggled on for nearly two years; but in 1820 he left in financial difficulty, and the plant and stock at the works were then purchased by Mr. Young.

The following is an extract from a memorandum of agreement made on the 2nd February 1822, between Mr. David Morgan of the town of Neath, ironmonger, of the one part, and William Weston Young, of the parish of Newton Nollage, land surveyor, of the other part, whereby it is agreed "that he [Morgan] shall  
 " not make bricks or any other articles from the said sand  
 " [Dinas sand†] without the consent of the said Wm. W. Young,  
 " who does also agree on his part to bind himself in the same  
 " manner and under the same penalties [5,000*l.*] not to reveal

---

\* "The Porcelain Works at Nantgarw," by Wm. Turner. *Trans. of the Cardiff Naturalists' Society*, vol. xx., 1888, p. 1.

† This is a siliceous deposit occurring in the Vale of Neath, in Glamorganshire, and valued for the manufacture of fire-bricks which are used in the construction of furnaces for copper-smelting.



" the said method to any other person or persons, or to make any fire-brick or any other articles for sale from the said sand without the consent of Mr. D. Morgan, but that he shall at all times be at liberty to make the said materials for his own purposes at *his china manufactory at Nantgarw* or elsewhere."

The works at Nantgarw continued to be carried on at a loss, and in October 1822, they were advertised for sale. It is believed that Billingsley went to Coalport in 1820, and entered the service of Mr. John Rose, and that on the sale of the Nantgarw works, two years later, Rose was a purchaser. Nantgarw china in the white was undoubtedly stored for years at Coalport, and it is stated that the services of Billingsley and Walker were continued there until the death of the former in 1828.

The Museum possesses some very characteristic examples of Nantgarw porcelain, illustrating the beautiful translucency of the paste, and the admirable flower-painting in Billingsley's style. The series is marked Q. 1 to 12. Most of these pieces bear the impressed mark, "NANTGARW," and the initials "C. W.," sometimes mistaken for "G.W." and assigned to George Walker.

## LEEDS POTTERY.

[Wall-cases XXXV. to XXXIX.]

The occurrence of excellent clays in the coal measures around Leeds probably led at a very early period to the manufacture of earthenware in this locality. It is believed that the suburb called Potternewton received its name from ancient pot-works established there,\* but nothing definite is known respecting the fictile industries of the district previously to the last century. Thoresby, writing in 1715, refers to the manufacture of tobacco-pipes at Leeds as "a manufacture but lately begun."

Pottery was manufactured at Leeds in 1760 by two brothers named Green, and this may be regarded as the foundation of the famous works. It is said that the earliest production was a black ware, but the manufacture of cream-coloured ware must have been soon afterwards introduced. Clays were brought from Devon and Cornwall; and probably Poole clay was employed from the commencement of the works,† but local clay from Wortley was also used. The pottery was conducted at an early date under the style of "Humble, Green, and Co." By an agreement, dated November 11, 1775, "Joshua Green, of Middleton, gent., and John Green, of Hunslet, potter, with divers others, under the firm of Humble, Green, and Co., agree with Messrs. Hutchinson and Evers to erect and maintain in repair at

\* "Historical Notes of the Leeds Old Pottery." By Joseph R. Kidson and Frank Kidson. Leeds, 1892, p. 13.

† In 1796, Hutchins mentions, in his *History of Dorset*, that much of the Poole clay was exported "to Selby, for the use of the Leeds potteries."

their mill a water-wheel with all necessary machinery for grinding flints. For 13 years the wheel was to be used exclusively by the Greens, who were to supply burnt flints and to pay 10s. for every 100 pecks of well-ground and levigated flints, the workman's wages being first deducted.

Much of the success of the factory seems to have been due to the energy of a Mr. William Hartley, who became a partner in the firm, which was then known under the style of "Humble, Hartley, Greens and Co." Messrs. Kidson have reprinted an advertisement from the *Leeds Intelligencer*, for February 19, 1781, which announces the retirement of Richard Humble, and the assumption by the new firm of the title of "Hartley, Greens and Company."

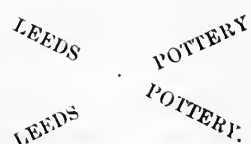
At one time they carried on an extensive trade with Russia, their agent in that country being first Mr. Barwick, and afterwards his nephew, Mr. Jubb. As the Leeds pottery was found to effectually withstand the severity of the climate, it enjoyed almost a monopoly of the Russian market, until superseded by the lighter ware manufactured by Wedgwood.

Illustrated pattern books of the Leeds pottery were published by Messrs. Hartley, Greens & Co., and these offer valuable aid in the identification of the ware. One of these catalogues printed in English, French, and German, is in the library of the Museum of Practical Geology, and bears the following English title: "Designs of sundry articles of Queen's or Cream-colour'd Earthen-Ware, manufactured by Hartley, Greens, and Co. at Leeds Pottery; with a great variety of other articles. The same Enamelled, Printed, or Ornamented with Gold to any Pattern; also with Coats of Arms, Cyphers, Landscapes, &c. &c. Leeds, 1786." The French title-page in the same copy is dated 1785, while the German title bears as early a date as 1783. This copy, from which three plates are missing, was presented to the library by Mr. W. Sykes Ward, of Clay Pits House, Leeds. A second copy of the Leeds pottery pattern book was presented in 1865 by the late Mr. Llewellyn Jewitt, F.S.A. It contains the three plates missing from the former copy, with many additional illustrations, but has no title-page. It is, however, of much later date, as the paper bears a water-mark dated 1814.

It appears that after the death of Mr. Hartley difficulties arose among the partners, and the property was thrown into Chancery. The business subsequently passed into the hands of Mr. Samuel Wainwright, then to Messrs. S. & J. Chappell, and afterwards to Messrs. Warburton and Britton. According to Messrs. Kidson, the old factory may be said to have come to an end in the year 1878.

Much of the cream-coloured or Queen's ware manufactured at Leeds during the best period bore considerable resemblance to Staffordshire pottery. It is thickly coated with a brilliant glaze, of slightly greenish tint, composed, according to *The*

*Leeds Guide*, of 1806, as quoted by the Kidsons, of 60 parts of white lead to 10 of flint and 20 of Cornish stone. Perforated work is frequently introduced, but is commonly confined, as shown in the books of designs, to a few characteristic patterns.

Although the ware was but rarely marked, several of the specimens in the collection are stamped with the name of the pottery in full. Thus the cream coloured dishes marked R. 2 and 3, bear the impressed mark, "LEEDS POTTERY"; whilst the oval dish, R. 1, is stamped "HARTLEY, GREENS, & CO., LEEDS POTTERY," with the figure 5. On the open-work basket of cream-ware, R. 11, the stamp is repeated cross-wise:  The teapot, R. 30, which is notable for its ornamentation of chequer work and bands in orange and brown, is also stamped "LEEDS POTTERY." The barrel-shaped tea-pot, R. 42, bearing a similar stamp, is decorated with marbling, resembling that of the Staffordshire marble ware. Similar decoration will be found on the specimens R. 41 and 43, but these are unmarked.

Examples of painting on Leeds ware are furnished by the plate R. 13, which is enamelled with flowers in green; the dish R. 17, ornamented in colours, with flowers and insects; the jug R. 35, painted with flowers and inscribed " . . . Scudmore, 1771"; and the teapot R. 29, ornamented in red and black with a wheatsheaf on one side, inscribed "Success to the Grain Return'd," and with a plough on the other side, inscribed "God speed the Plough."

As an example of very superior decoration, attention may be called to the oval dish, R. 16, which has the centre painted with a portrait in purple, surrounded by a gilt scroll border and flowers.

Transfer-printing in black on the cream-coloured ware of Leeds is well illustrated by the tea-kettle, with its stand and cover, R. 28, decorated with birds and with an allegorical subject, and inscribed "Let Wisdom unite us." The coffee-pot, R. 35a, which is ornamented in black transfer printing over the glaze with subjects relating to courtship and marriage, treated allegorically, is noteworthy in that one of the engravings is inscribed "*Leeds Pottery*." The decoration on the cup and saucer, R. 33, is printed in red.

It is known that the Leeds pottery had at one time an extensive continental trade, and the pattern book of the pottery was issued in several languages. A specimen of the ware made for the Dutch market is furnished by the oval dish, R. 14, which has the centre ornamented with black transfer-printing, representing a figure of Liberty with lion couchant and military trophies, and inscribed "Voor Vrijheid en Vaderland." The pieces R. 31 and 32 show the coarse style of decoration

frequently found on cream-coloured ware, which was probably painted in Holland, though made at Leeds. These specimens are rudely painted with male and female portraits, one on each side of an orange tree, inscribed "PVOR," and bearing a Dutch legend. It is believed that the portraits are those of the young Prince William V. of Orange and his wife Sophia Wilhelmina, whom he married in 1797. Similar pieces are sometimes attributed to Turner, of Caughley, Shropshire.

### DON POTTERY.

[Wall-case XXXVIII.]

Towards the close of the last century the success of the Leeds pottery led to the establishment of several other manufactories in the district. About 1790 Mr. John Green left Leeds, and established a pottery at Swinton, on the River Don. Subsequently he was joined by other members of his family, and the title of the firm became "Greens, Clark, and Co." In 1834 the works were purchased by Mr. Samuel Barker, and are still in the possession of his family. The early pieces, chiefly of cream-coloured ware, are stamped with the name of the pottery in full.

Three examples of Don ware are exhibited under the reference-marks R. 47. to R. 49.

### CASTLEFORD POTTERY.

[Wall-case XXXIX.]

At Castleford, near Leeds, a pottery was established about the year 1790 by Mr. David Dunderdale. At the beginning of the present century the works were conducted by Messrs. D. Dunderdale and Co.; and the pieces of this date are inscribed "D. D. & Co." In 1820 the works were closed, but a part was afterwards taken by some of the workmen. Subsequently they passed into the hands of Messrs. Taylor, Harrison, and Co., who were succeeded, in 1854, by Messrs. Thomas Nicholson and Co.

Four characteristic specimens of Castleford ware are exhibited as R. 50 to 53.

### FERRYBRIDGE POTTERY.

[Wall-case XXXVIII.]

A pottery was established in 1792 at Ferrybridge by Knottingley, near Pontefract in Yorkshire. Originally conducted under the name of Tomlinson and Co., the firm assumed the style of Wedgwood and Co. on the introduction in 1796

of Ralph Wedgwood, the son of Thomas Wedgwood, who was the partner of the great Josiah Wedgwood, many of whose productions were imitated at this pottery. Four specimens, designated R. 54 to 57, are exhibited in illustration of the Ferrybridge ware. The first two pieces are stamped "WEDGWOOD & CO." and the last bears the impressed mark "FERRYBRIDGE."

## PLACE'S WARE.

[Wall-case XXXIX.]

A fine description of pottery was manufactured at an early date by Mr. Francis Place at the Manor House at York. Mr. Place was a son of Mr. Rowland Place, of Dimsdale, in the county of Durham, and acted as clerk to an attorney in London until 1665. The remainder of his life was apparently devoted to artistic and experimental pursuits. He died in 1728. Ralph Thoresby states, in his *Ducatus Leodiensis*, that Mr. Place discovered an earth well fitted for the manufacture of fine ware, and that "his pottery cost him much money; he attempted it solely from a turn for experiments, but one Clifton took the hint from him, and made a fortune by it." One of "Mr. Place's delicate fine mugs," said to have been "equal to true china ware," was in Thoresby's museum, and is described as being "made of English materials in the manor House at York, by the very ingenious Mr. Francis Place, who presented it to me, with one of the outer covers [saggers], purposely made to preserve them from the violence of the fire in baking."

Lord Orford (Horace Walpole) says:—"I have a coffee-cup of his ware; it is of gray earth, with streaks of black, and not superior to common earthenware." This cup was sold at Strawberry Hill, and passed into the hands of Mr. A. W. Franks, by whom it was presented, in 1869, to this Museum. It is represented in Fig. 131. An old pasteboard label, attached to the handle of this cup, is inscribed, probably in Walpole's handwriting, "Mr. Francis Place's China."



FIG. 131.

## LIVERPOOL POTTERY AND PORCELAIN.

[Wall-case XXXIX.]

The late Mr. Joseph Mayer, the historian of the Liverpool works, unearthed from the list of town-dues payable at the port of Liverpool in 1674 several items showing that the manufacture of pottery was established in the town at that early date.

Specimens of Liverpool ware referable to the early part of the eighteenth century are still extant, two specimens of blue-painted coarse ware being dated respectively 1716 and 1722. In a description of the town published in "The Liverpool Memorandum Book, or Gentleman's, Merchant's, and Tradesman's Daily Pocket Journal for the year 1754," it is stated that "the chief manufactures carried on here are blue and white earthenware, which at present almost vie with china." Indeed, at one time pottery appears to have been the staple manufacture of the town.

The principal Liverpool potters were Alderman Shaw, James Drinkwater, Richard Chaffers, Seth Pennington, Philip Christian, and Zachariah Barnes. Large punch-bowls of delft ware painted in blue were made by both Shaw and Pennington, and the latter manufactured china resembling oriental porcelain and ornamented with a rich blue colour.

Several punch-bowls, believed to be of Liverpool manufacture, are exhibited in this collection. One of exceptional size, having a diameter of upwards of 20 inches, is placed on the top shelf of Case XXXIX. It is a bowl of delft ware, ornamented in blue with military trophies on the outside, and a three-masted man-of-war on the inside; the sea is coloured green, while the union-jack, ensign, and pennant are touched with red. The trophies are very similar to those on a bowl figured by Mr. Mayer,\* said to have been made at Seth Pennington's and painted by John Robinson.

The following specimens are placed on the bottom shelves of Cases XXXVIII. and XXXIX. The delft bowl S. 11 is inscribed "Success to Trade"; S. 12 bears the inscription "Wilkes and Liberty"; S. 13 has the motto "God grant Unity," with date 1749; S. 15 is painted in blue, with a three-masted man-of-war in sail, inscribed "Success to the Friend-ship, 1766;" whilst S. 16 is painted with flowers in green, blue, purple, and yellow, in panels on mottled purple ground, and inscribed "One Bowle more & then."

The large punch-bowl S. 14, placed on the top shelf of Case XXXIX, is ornamented with flowers painted in blue, and inscription, "Parliment (*sic*) Bowl, free without Excise, 1736."

To Mr. John Sadler, of Liverpool, is generally attributed the discovery of the useful art of printing on pottery from copper-plate engravings. Mr. Binns has shown that Alderman Jansen first printed on enamelled metal objects at the works at Battersea, but the application of printing to ceramic decoration seems to have been independently developed at Liverpool. John Sadler, the inventor, was the son of Adam Sadler, a printer in Liverpool, who had formerly served as a soldier under the Duke of Marlborough in the wars in the Low Countries. John Sadler carried on the business of an engraver in Harrington Street,

---

\* "History of the Art of Pottery in Liverpool," 1855, p. 22.

and having noticed that some of his waste prints were used by children to stick on to fragments of earthenware obtained from the potteries, he commenced experiments with a view of extending this application to purposes of decoration. With this object he associated himself, about the year 1750, with Mr. Guy Green, who had succeeded to the printing business of Mr. Adam Sadler. It was proposed to apply to the King for a patent, and the documents necessary for this purpose were prepared; but it was afterwards considered desirable to keep the process secret and not to secure patent rights.\*

Much of Wedgwood's cream-coloured ware was sent weekly by carriers' waggons from Staffordshire to Liverpool, where it was printed by Sadler and Green, and afterwards returned by the same means to Wedgwood. Even as late as 1794 this arrangement was continued.

Several examples of Liverpool printed ware will be found in the collection.

The mug S. 7 is printed with the Buck's Arms, and has the engraving signed "*Sadler, Liverpool.*"

The tea-pot S. 8 is printed on one side with a portrait of John Wesley, inscribed in a ribband "JOHN WESLEY, M.A., FELLOW OF LINCOLN COLLEGE, OXFORD;" on the reverse the following inscription, surrounded by scroll-work and sacred vignettes: "Let your Conversation be as becometh the Gospel of CHRIST;" the engraving of Wesley is signed "*Green, Liverpool.*"

A small series of Liverpool printed stove-tiles is displayed in a case attached to the pillar opposite Wall-case VIII., on the opposite side of the Museum. The engraving on one of these is signed, "*J. Sadler, Liverpool.*"

On a site formerly occupied by copper works on the south side of the Mersey, near Liverpool, a pottery was started about 1794 by Messrs. Abbey and Graham. Mr. Richard Abbey had been an engraver in the employ of Mr. Sadler, and had afterwards

\* The late Mr. Joseph Mayer published, among other documents, the following affidavit:—

"I, John Sadler, of Liverpool, in the county of Lancaster, printer, and Guy Green, of Liverpoole aforesaid, printer, severally maketh oath, that on Tuesday, the 27th day of July instant, they, these deponents, without the aid or assistance of any other person or persons, did, within the space of six hours, to wit, betwixt the hours of nine in the morning and three in the afternoon of the same day, print upwards of twelve hundred earthenware tiles of different patterns at Liverpoole aforesaid, and which, as the deponents have heard and believe, were more in number and better and neter than one hundred skilful pot painters could have painted in the like space of time in the common and usual way of painting with a pencil; and these deponents say that they have been upwards of seven years in finding out the method of printing tiles, and in making tryals and experiments for that purpose, which they have now, through great pains and expense, brought to perfection.

"(Signed) JOHN SADLER.

"GUY GREEN.

"Taken and sworn at Liverpoole in the County of Lancaster, the second day of August one thousand seven hundred and fifty-six, before Wm. Stratham, a Master Extraordinary in Chancery."

been engaged at potteries in Glasgow and in France. He soon retired from the business, which then passed into the hands of Messrs. Worthington, Humble, and Holland. They engaged a number of operatives from the Staffordshire potteries, and founded the colony called Herculaneum. About the year 1800 the manufacture of china was introduced. In 1806 the works were enlarged, and the number of proprietors increased. The Company was dissolved in 1833, and the property sold. Messrs. Case and Mort then leased the pottery of the purchaser, and carried on business there until 1836, when it passed into the hands of Messrs. Mort and Simpson, who occupied it until 1841. At that date the pottery was discontinued, and the site occupied by the Herculaneum Dock.

The specimens S. 1 to S. 3 are stamped "HERCULANEUM," while S. 4 and 4a bear the impressed mark of a liver. This bird, forming the crest of the borough of Liverpool, was used as a mark at the Herculaneum pottery by Messrs. Case, Mort, and Co.

---

*Miscellaneous pieces of old English Pottery.*

The shelf below the Leeds and Liverpool ware is occupied by a collection of miscellaneous specimens of old English pottery, of which but few are marked. They are mostly of Staffordshire ware, but some may probably be attributed to Newcastle. Those which present examples of early transfer-printing were in all likelihood decorated at Liverpool. It should be understood, however, that it is merely convenience of space which has led to the selection of this position, and that it is not by any means to be supposed that the specimens here collected have any connexion with the Liverpool pottery, except where this is distinctly specified or suggested. Many are interesting for the mottoes they bear or for the historical events which they commemorate.

The toad-mug S. 17 has the following legend painted in black, and surrounded by a rude floral border in colours :—

" Tho' malt and venom  
 " Seem united  
 " Don't break my pot  
 " Nor be affrighted."

The tythe-mug, S. 20, is ornamented in black transfer-printing, inscribed, "Jameson," and rudely painted in red, yellow, and green; subject, "Tythe in kind, or the Sow's Revenge"; a clergyman collecting tithes attacked by a sow in a pigstye to the amusement of the farmer's family, and crying,—

" The fattest Pig it is my due,  
 " Oh! Save me from the Wicked Sow."

The mug, S. 21, is also printed in black, the subject being the farmer and wife offering babe to the vicar, with doggerel entitled "The Tithe Pig," commencing;

" In Country Village lives a Vicar  
 " Fond as all are of Tithes and Liquor."



The barrel-shaped mug, S. 22, is printed, and rudely painted with a drinking party, inscribed,

*"J. Ansley, Lane End;"*

with verses, from the "School for Scandal," entitled, "*The General Toast.*" The verses begin thus :

"Here's to the maid of bashful fifteen

"Likewise to the matron of Fifty

"Hear's (*sic*) to the bold and extravagant Queen

"And here's to the housewife thats thrifty."

The Rodney Mug, S. 23, bears two relief portraits, Lord Rodney and an oval medallion with a ship, laid on in cream-coloured paste, tinted green. The vessel represented is De Grasse's flag-ship, "*Ville-de-Paris,*" which was taken by Rodney in 1782.

The next piece, S. 24, is a jug printed in purple, with a three-masted man-of-war, and a copy of West's picture of the death of General Wolfe, 1759. The specimen was probably made by Thomas Wolfe, of Stoke-upon-Trent, who claimed relationship with the General.

The large jug, S. 25, is ornamented with transfer-printing in red outline, and painted with colours. On one side a hay-making scene ; on the other side John Bull seated on a column inscribed, "*The British Constitution,*" and looking across the Channel at Napoleon, who is weeping at the loss of the flotilla, and exclaiming, "O! my poor Crazy Gun Boats, why did I venture so far from home?" while the Englishman cries, "I Told you they would be all swamp'd, but you would be so d——d Obstinate;" the whole inscribed "*Patience on a Monument smiling at Grief!!*" with the following distich :—

"The Mighty Chief with fifty thousand Men,

"March'd to the coast, and March'd back again

"Ha! Ha! Ha!"

The three specimens S. 26 to 28 refer to Nelson, and S. 29 to Wellington. The mug, S. 30, presented by Mr. Franks, C.B., is printed in black, with Duncan's ship, "*Venerable*" in full sail towing De Winter's ship, "*Vrijheid,*" inscribed with the following verse :—

"Vain are the Boasts of Belgick's sons

"When faced by British ships and guns ;

"Tho' de Winter does in Autumn come

"Brave DUNCAN brings his harvest home."

On the mug, S. 31, is a print in black of Louis XVI. taking leave of his family on the morning of his execution ; the engraving signed, "*Fletcher & Co., Shelton.*" Thomas Fletcher is known to have been in business at Shelton in the early part of this century, not as a potter, but as a "black printer and "enameller." Louis XVI was executed on 21st January 1793. The engraving bears verses commencing as follows :—

"Farewell Queen, Children, Sister, Louis cries,

"Abate your grief & dry those streaming Eyes."

The next piece, S. 32 is printed in brown with the "Farmer's Arms," and mottoes, "All our Trust is in God," and "Industry produceth Wealth," with verses beginning:—

"May the Mighty and Great  
"Roll in Splendor and State  
"I envy them not I declare it."

The specimen S. 33 is a mug printed in black with the "Baker's Arms," and motto, "Praise God for all"; the engraving signed, "*S. Daniel, Stoke.*"

On the top shelf of Wall-case XXXVIII., is an exceptionally large jug, with the Blacksmith's arms printed in black, and motto, "By Hammer and Hand, all Arts do stand."

A very large jug on the top of Case XXXVII. is ornamented with caricatures, outlined in brown transfer-printing over the glaze, and rudely coloured by hand. On front is a view of the burning of Moscow, from the Kremlin, September 14, 1812, inscribed in the clouds of smoke, "Hurrah Your Serene Highness": on one side of the jug, a figure of a Russian soldier returning home with French pigmy-soldiers impaled on his bayonet, and strung up on his gun, preceded by a little boy astride of the French eagle; inscribed in English and Russian, "A Russian boor returning from his field sports": on the opposite side of the jug a Russian soldier hewing down a Frenchman with a hatchet, inscribed, "Specimen of Russian chopping blocks"; below this scene an inscription in English and Russian, "So you'r the last! says this brave honest Man, Now Nap. return to "Russia if you can"; around the neck of the jug the following inscriptions, "Europe preserved, September 14th, 1812," and "Hourrah Your Serene Highness."

#### NEWCASTLE AND SUNDERLAND POTTERY, &c.

##### [Wall-cases XL. to XLIV.]

A considerable manufacture of common earthenware has long been carried on in the North of England, especially in the neighbourhood of Newcastle and of Sunderland. As early as 1730 or 1740 the manufacture of white earthenware was introduced into the district by Mr. Warburton at the Carrs Hill Pottery, near Gateshead, on the Durham side of the Tyne; a pottery which, after having been successfully conducted for 70 years, gradually declined, and was closed in 1817. About 1755 Mr. Byers established works at Newbottle, and in 1762 Messrs. Christopher Thompson and John Maling erected potteries at North Hylton, near Sunderland. In 1817 Mr. Robert Maling removed the business from Hylton to the Tyne. Messrs. Dawson established a pottery at Hylton in 1800, and Messrs. Phillips have also had works at this locality. At Southwick, near Sunderland, Scott & Co. erected potteries in 1789, and Moore & Co. in 1803. About the beginning of the present century Messrs. Dixon, Austin & Co.,

and Messrs. Phillips, had potteries in the neighbourhood of Sunderland.

At St. Anthony's, near Newcastle-upon-Tyne, potteries were established between the years 1780 and 1790, and many pieces from these works bear the mark of Sewell and Donkin. St. Peter's pottery, near Newcastle, was built by Thomas Fell & Co. in 1817.\*

The cream-coloured fruit-dish and stand, T. 1, is stamped, "FELL, NEWCASTLE," a mark which also appears on the next piece, while some of the other specimens are stamped simply "FELL." The frog-mug, T. 3, inscribed "Newcastle pottery," is printed with trophies to the memory of Lord Nelson, and inscribed with memorial verses, commencing thus :

"Remember whilst his mortal part has rest  
"Th' immortal lives in every Briton's breast."

Another frog-mug, T. 4, is rudely ornamented with the purple metallic lustre characteristic of Newcastle and Sunderland wares, and it also bears the following verses printed in brown, beneath a ship :—

"Thou noble bark of brightest fame,  
"That bear'st proud England's honoured name,  
"Right welcome home once more !  
"Welcome thou gallant little sail  
"In England's name I bid the (*sic*) hail !  
"And welcome to her shore."

Marine subjects were, naturally popular at potteries situated near seaport towns, and several will be found on these products of the Northern potteries. The slab, T. 8, shows a frame in purple lustre surrounding a printed transfer of a man-of-war in full sail, inscribed :

"May Peace and Plenty on our Nation Smile  
"And Trade with Commerce bless the British Isle."

The celebrated cast-iron bridge over the Wear, uniting Monkwearmouth and Bishopwearmouth, which was commenced in 1793 and completed in 1796, formed the subject of many engravings on pottery. The mug T. 5 is printed with "An East View of the "Iron Bridge over the Wear, near Sunderland; Foundation stone "laid by R. Burdon, M.P., Sept. 24th, 93"; inscribed, "Edwd. Barker."

The bridge is likewise represented on the large jug, T. 6, which also bears a print of the "Northumberland 74," and verses entitled "Forget-me-not," which begin thus :

"The sailor tost in stormy seas,  
"Though far his bark may roam,  
"Still hears a voice in every breeze  
"That wakens thoughts of home."

---

\* For many of the facts stated above we are indebted to Mr. Christopher Thompson Maling's notice in "The Industrial Resources of the District of the Three Northern Rivers, the Tyne, Wear, and Tees." (2nd ed., 1864.)

This piece is inscribed "J. PHILLIPS, HYLTON POTTERY." The same verses and a view of the bridge over the Wear are printed on the large jug, T. 9, which is marked "DIXON, AUSTIN, & CO., SUNDERLAND."

The bridge appears again on the bowl, T. 7, associated with nautical subjects, and the following verses:—

"Glide on my bark, the summer's tide,  
 "Is gently flowing by thy side;  
 "Around thy prow the waters bright  
 "In circling rounds of broken light,  
 "Are glit'ring as if Ocean gave,  
 "Her countless gems to deck the wave."

The name of "SEWELL" is impressed on T. 11; that of "SEWELL & DONKIN" on T. 12, and "SEWELLS & DONKIN" on T. 13, and the following piece; whilst "SEWELLS & CO." is the mark on T. 15. Among other marks in this series the following will be found: "PATTERSON & CO., TYNE POTTERY," on T. 16; "SCOTT," on T. 17; "DAWSON & CO." on T. 18; and "MOORE & CO." on T. 19. The fruit-basket and stand, T. 20, is stamped "W. S. & CO., QUEEN'S WARE, STOCKTON," the initials being those of William Smith and Co., of Stockton-on-Tees. The following piece is stamped, "W. S. & CO.'S WEDGWOOD." In 1848 an injunction was applied for by Messrs. Wedgwood, of Etruria, to restrain some of the Stockton potters from using such marks as this.

The specimen T. 22 represents the pottery at Middlesbro'-on-Tees, in Yorkshire, and bears, as an impressed mark, an anchor and the words, "MIDDLESBRO POTTERY." A plate, with the willow pattern in blue, is not only stamped, "BELLE VUE POTTERY, HULL," but bears a similar inscription, printed in blue cursive characters under the glaze. This was presented in 1893 by Mr. F. Boynton, of Bridlington Quay.

---

#### NOTTINGHAM EARTHENWARE, &C.

##### [Wall-case XL.]

It is known that the manufacture of certain kinds of pottery, especially a brown-glazed earthenware, was long carried on in the town of Nottingham, and was probably not abandoned until the beginning of the present century. In a list of trades and employments exercised in the town, with the number of masters in each, made in 1641, one potter is mentioned, and in a similar list for 1739 two potters appear. About the middle of the last century the trade became more active, and Dr. Deering in his *Historical Account of Nottingham* (1751) mentions that the town sends down the river (Trent) coals, lead, timber, corn, wool, and *potter's ware*. Under the year 1757 in Bailey's *Annals of Nottinghamshire*, we read that, "Mr. Morley was a manufacturer of brown earthenware, carrying on his works in the lower part of Beck Street, on the road to St. Ann's Well; and by this business he amassed a very considerable fortune. This ware

" was at one time of great celebrity throughout the whole of the  
 " Midland Counties, especially its famous brown mugs for the  
 " use of public-houses; and it is remarkable that though these  
 " works have been discontinued now for a hundred years,\* the  
 " appellation of *Nottingham ware* is still, in many remote  
 " villages, attached to the better and more highly finished class  
 " of brown earthenware pots of every description." No fewer  
 " than 12 pot makers are mentioned in "An exact list of the  
 " Burgesses and Freeholders of the town and county of the  
 " town of Nottingham . . . who polled . . . at  
 " the election of two Burgesses to serve in Parliament," in 1774,  
 but in a similar list for 1803 only one potter is named. The  
 cause of the decline of the trade was the competition of the  
 Staffordshire manufacturers. Thus, Blackner in his *History of*  
*Nottingham*, published in 1815, says that "there were likewise  
 " two potteries within the last thirty years . . . But the  
 " clay was principally brought from a considerable distance,  
 " which added so much to the cost of the pots as to prevent the  
 " proprietors maintaining a competition with the Staffordshire  
 " dealers."

Mr. Morley's pottery was situated in Mug House Yard, Mug  
 House Lane, Beck Street, and the other works mentioned by  
 Blackner were on the east side of what is now Milton Street.

It is believed that some part of the clay used for the brown  
 ware was obtained from the neighbourhood of Hucknall Torkard,  
 in Nottinghamshire, while a yellow clay was procured from  
 Staffordshire.†

The large christening bowl, U. 1, in brown glazed earthenware,  
 is inscribed in incised cursive characters, *November 20, 1726.*"  
 The huge brown bowl, U. 2, is incised in like manner with the  
 words, "*Old England for Ever, 1750.*" The large mug in brown  
 ware, U. 3, presented by Mr. Edmund Percy, bears an incised  
 inscription in cursive characters round the rim, "*Made at*  
*Nottingham ye 17th Day of August, A.D. 1771.*" On the brown  
 mug, U. 4, the name and date are scratched in the paste, thus:—  
*"Edw. Stark, 1772."*‡

#### LOWESBY POTTERY.

[Wall-case XLI.]

A small pottery was established at Lowesby, in Leicestershire,  
 by Sir F. G. Fowke about the year 1835, but has long been dis-  
 continued. A red paste was manufactured from the lias clays of

\* This is clearly an error. Bailey's work was published in 1855, and there is  
 evidence to show that the manufacture of pottery in Nottingham was not discon-  
 tinued until, at the very earliest, the latter end of the last century.

† For much of the information on Nottingham ware we are indebted to Mr.  
 E. B. Rothera and Mr. Briscoe, of Nottingham.

‡ The late Mr. Llewellyn Jewitt referred to a Nottingham posset-pot, made for  
 S. Watkinson, the Mayor, and dated as early as 1700.

the district, and some of the pottery was modelled after Etruscan forms.

Three specimens are exhibited, of which two bear the impressed mark, "LOWESBY" and a fleur-de-lis.

"YARMOUTH POTTERY," &c.

[Wall-case XLI.]

It is known that about the end of the last century a potter named Absolon had works at a place still known as "The Ovens" at Yarmouth. It appears, however, that no potting was ever done there, but that the business consisted simply in decorating ware manufactured elsewhere, and firing the colours in a gloss-kiln. The mark of "*Absolon Yarmb*" is found on pieces stamped with an arrow, but it is at present uncertain to what factory the mark of the arrow should be attributed. The arrow is stamped on the three specimens, V. 1 to 3; while the flower-pot, V. 7, bears the impressed mark, "WEDGWOOD," and is also marked in brown,—"*Absolon, Yfmb. No. 25*," shewing clearly that

Absolon imported white ware from the Staffordshire potteries. Some of the specimens, as V. 4 to 6, are painted boldly with flowers, having the names written on the back in red.

LOWESTOFT PORCELAIN AND POTTERY.

[Wall-case XXXIV.]

According to Gillingwater's "History of Lowestoft," written in 1790, the manufacture of porcelain was attempted in the year 1756 by Mr. Hewlin Luson, of Gunton Hall, near Lowestoft. Although his experiments were frustrated, a porcelain factory was established at Lowestoft in the following year by Messrs. Walker, Brown, Aldred, and Richman. A soft paste was first made, but it is asserted that about 1780 the manufacture of a hard body was introduced. It is generally considered that much of the so-called Lowestoft china is merely Oriental porcelain, possibly decorated at Lowestoft, but the late Mr. Chaffers maintained that hard paste was manufactured there.

The period of greatest prosperity of the Lowestoft works was between 1770 and 1800. In the year 1802 the works were abandoned, and the stock sold.

From certain pieces of delft ware bearing inscriptions and dates as early as 1752, it appears probable that before the manufacture of porcelain was introduced common pottery had been manufactured at Lowestoft, or at least that delft ware had been painted in this locality.

The small series of specimens, illustrating the Lowestoft products, is placed near the Swansea porcelain, on the lower shelves of Wall-case XXXIV. It should be understood, however that several of the pieces are placed with the "Lowestoft china" simply in deference to the opinions of certain collectors and not as authenticated specimens.

### WROTHAM POTTERY.

[Wall-case XLIV.]

Coarse earthenware, decorated in many cases with slip ornament, was made at Wrotham, in Kent, certainly towards the close and probably as early as the middle of the 17th century. A dish in the British Museum is dated "Wrotham, 1699;" while a piece in Mr. C. W. Reynolds' collection, which had long been in the possession of a Kentish family, and was traditionally referred to Wrotham, bears the date 1668. Mr. and Miss Hodgkin figure a piece in the Liverpool Museum, reputed to be of Wrotham manufacture, and bearing as early a date as 1612.

A double-handled possett-pot, W. 1, is exhibited as a sample of this ware. It was obtained from the Marryat Collection, and is inscribed in rude characters, laid on in slip before glazing, "WROTHAM," with initials "I. E." and date 1703. It is probable that many pieces of slip ware, usually referred to the Staffordshire potteries, may be more justly assigned to Wrotham.

In connexion with the history of pottery in Kent, it may be mentioned that records are extant showing that as early as 1582 a Dutch potter was settled at Sandwich.

### CADBOROUGH POTTERY.

[Wall-case XLIV.]

At Cadborough, near Rye, in Sussex, a pottery was established about the beginning of the present century, and the manufacture of a red ware is still carried on to a limited extent by Mr. Mitchell. The coarse red body is coated with a brilliant lead glaze, producing a mottled green or brown surface.

Mr. H. Willett, of Brighton, possesses several pieces of Rye pottery, inscribed with the name of the locality and dated. To him the Museum is indebted for a mug in red glazed ware, ornamented with yellow stars, and inscription "E.\* C.\* FEBUARY (*sic.*)\* 18\* 1811\*;" the figure 4 rudely scratched in the base.

A specimen of similar ware in Mr. Willett's Collection is inscribed "Rye Pottery."

## BISHOP'S WALTHAM POTTERY.

A large vase in red ware, ornamented with classical subjects in black, is mounted on a pedestal near Case XLIV., and is a fine example of the pottery made at Bishop's Waltham, in Hampshire, where works were first established in 1862.

## BRANKSEA POTTERY.

[Wall-case XLIV.]

Many years ago an attempt was made to establish a pottery on Branksea Island, opposite Poole, on the coast of Dorsetshire. It is believed, however, that after a few trials the project was abandoned. A small pitcher, W. 5, with a sample of the local clay from which the ware was manufactured, is here exhibited.

## WATCOMBE TERRA-COTTA.

[Wall-cases XL. to XLII.]

The origin of the terra-cotta works at Watcombe, near Torquay, is due to the discovery, some years ago, of a deposit of fine red clay during some excavations near Watcombe House, the residence of Mr. G. J. Allen. As the clay was found to be admirably adapted to the purposes of modelling, a company was formed for its utilisation; and the manufacture of terra-cotta was started under the management of Mr. C. Brock. The works have been conducted with great spirit; and the fine examples of the ware which have been presented to the Museum by the company (W. 7 to 21) sufficiently attest the taste and skill which have been brought to bear upon the manufacture. The pieces issuing from these works are marked with the words, "Watcombe, Torquay," either impressed or printed.

A sample of the Watcombe clay is exhibited as W. 6.

The following analysis of this clay was made in Dr. Percy's laboratory, by the late Mr. J. W. Ward:—

Silica	-	-	-	57.83
Alumina	-	-	-	20.55
Peroxide of iron	-	-	-	7.75
Lime	-	-	-	1.68
Magnesia	-	-	-	0.97
Peroxide of manganese	-	-	-	trace.
Carbonic acid	-	-	-	0.90
Potash	-	-	-	3.87
Soda	-	-	-	0.56
Phosphoric acid	-	-	-	trace.
Water, hygroscopic	-	-	-	2.13
„ combined	-	-	-	4.39
				<hr/> 100.63 <hr/>

Other potteries have been established at Bovey Tracey, at Barnstaple, and elsewhere in Devonshire, but their productions are not at present represented in this Collection.



## FULHAM POTTERY.

[Wall-case XXX.]

It has been already mentioned (p. 15) that John Dwight, of Oxford, had discovered the manufacture of an imperfect kind of porcelain, certainly as early as 1671. On the 13th of April of that year letters patent were granted to Dwight for "the mystery of transparent earthenware, commonly knowne by the names of porcelaine or China, and Persian ware, as alsoe the misterie of the stone ware, vulgarly called Cologne ware." In this patent we are told that "at his own proper costs and charges, he hath invented and sett up at *Fulham*, in our county of Middlesex, several new manufactories." So important were Dwight's discoveries, that Dr. Plot, in his *History of Oxfordshire*, published in 1677, sums up his account by saying "in short, he has so advanced the *Art Plasticke*, that 'tis dubious whether any man since Prometheus have excelled him, not excepting the famous Damophilus and Gorgasus of Pliny."

The materials which Dwight employed in the Fulham pottery are not specified in either of the two patents which he obtained. Dr. Plot, speaking of the manufacture, says "these arts he employs about materials of English growth, and not much applied to other uses; for instance, he makes the stone bottles of a clay in appearance like to tobacco-pipe clay, which will not make tobacco-pipes, although the tobacco-pipe clay will make bottles." Books containing recipes for use at the Fulham works are extant, bearing dates 1692 and 1698.

A fine collection of authenticated pieces of early Fulham ware, formerly in the possession of the family, then of Mr. Baylis, and afterwards of Mr. C. W. Reynolds, was dispersed a few years ago. Some of the finest pieces, however, including examples of Dwight's admirable stoneware, are preserved in the South Kensington Museum and in the British Museum.

After the death of John Dwight, the pottery at Fulham is said to have passed into the hands of a Margaret Dwight, who entered into partnership with Thomas Warland; but some years afterwards these proprietors became insolvent. Subsequently Miss Dwight married a Mr. White, and the works long remained in the possession of their descendants. In 1864 they passed into the hands of Mr. C. J. C. Bailey.\*

On one of the lower shelves is a small series (X. 1 to X 18), intended to illustrate the kinds of ware manufactured at Fulham; but the grounds on which several of these specimens are attributed to this factory are admittedly very slender.

Pieces in the style of the mug X. 1 are generally regarded as examples of Dwight's porcelain, but perhaps on insufficient grounds. The handle of a similar specimen in Mr. Solon's collection was found by Prof. Church to contain about 5 per cent. of soda.

---

\* "The Ceramic Art of Great Britain." By Llewellyn Jewitt, F.S.A. New edition, 1883, p. 88.

The early Fulham stoneware was in many cases ornamented with the initials of the reigning sovereign, and specimens thus marked are known to extend from the reign of Charles II. to that of George I. Queen Anne's initials,\* which are on the mug X. 2, and the following piece, would place the date of their manufacture somewhere between 1702 and 1714.

On X. 4 is a portrait of William III., while the specimens X. 5 to 7 bear the initials "G.R."

It is believed that these are examples of the Fulham stoneware made in imitation of the *grès de Flandres* or Cologne ware; but as this ware was largely imported into England, it is difficult to separate the home-made from the foreign pieces, and consequently it is possible that some of the specimens here referred to Fulham are of continental origin.

The jug, X. 17, in brown stone-ware ornamented with scroll-work in relief obtained by cutting away the base, and with stamped diaper-pattern, &c., filled in with blue, bears the artist's name scratched in the paste.—"R. W. Martin, Fulham." This is an example of modern ornamental stone-ware, thrown at Fulham, then decorated by Mr. Martin, and afterwards fired at the Fulham pottery.

The next piece, X. 18, is a terra-cotta plaque, with head of mother and infants in *intaglio rilievo*, stamped on the back "R.W.M." and 1871, with "Osler A. Munro" scratched in the paste.

## MORTLAKE POTTERY.

[Wall-case XXX.]

Lysons, in his "Environs of London," published in 1792, says, that about 40 years since a manufacture of delft and earthenware was established by William Sanders, which is still carried on by his son. In the Supplement to the same work, dated 1811, it is said that the manufactory was then carried on by Wagstaff & Co., and that there was a small manufactory of white stone-ware belonging to Mr. Joseph Kishere. Some of this ware was of a very superior make, much resembling that made by Dwight at Fulham. Although it is rarely marked, the following marks are occasionally found stamped upon it: "Kishere," "Kishere, Mortlake," and "Kishere's Pottery, Mortlake, Surrey."

The late Dr. Hugh Diamond, in 1875, presented the two specimens, X. 19 and 20, which serve to represent this pottery; the former piece bears an impressed mark "Kishere, Mortlake."

\* \* The initials "A.R." on certain pieces of continental manufacture may refer to Augustus, Elector of Saxony and King of Poland.

## ISLEWORTH POTTERY.

[Wall-case XXX.]

A small factory was established at Railshead Creek, Isleworth, in 1760, by Joseph Shore of Worcester. It is said that at first both pottery and porcelain were produced, but on the death of the superintendent Benjamin Quarman, in 1787, the manufacture of porcelain was discontinued. Much of the coarse pottery was known as "Welsh ware." About 1825 the works were removed to Hounslow, but were abandoned about two years after their removal.

Three pieces, X. 21 to 23, are exhibited, not without some doubt, as specimens of Isleworth ware.

## LAMBETH AND VAUXHALL POTTERY.

[Wall-case XXXVI.]

It is known that about the middle of the 17th century certain Dutch potters settled at Lambeth, and introduced the manufacture of glazed tiles. That such manufacture was established in London certainly as early as 1668 may be seen from the evidence given before the barons of the Court of Exchequer in a case relating to a parcel of potter's clay, belonging to Edmund Warner, which had been seized by the Custom House officers. This trial took place in 1693, and William Riddal then deposed that "he was Steward and Tenant to the said Warner for above 20 Years, in all which time the said Warner constantly sold to the Potters in London considerable quantities of the same sort of Clay now in dispute, for the making of White and Painted Earthen-ware." Evidence on Warner's behalf was also taken from five London potters: "William Knight, Thomas Harper, Henry de Wilde, John Robins, Moses Johnson, are all potters in London, and swore that they had all seen the said Warner's Clay, which was seized, that it was really Potter's Clay, and of the same sort which they had constantly bought of him, some for above 25 years, others ever since they were Traders."

On the 27th of October 1676, letters patent were granted to John Ariens Van Hamme, a Dutchman, who had settled in this country, for his "art of makeinge tiles and porcelane, and other earthenwares, after the way practised in Holland." It is probable that this Van Hamme may have established himself at Lambeth.

From what we know of the productions of the Lambeth potteries, they appear to have been chiefly delft and stoneware. The works flourished until the close of the 18th century,\* when they were unable to compete with the Staffordshire potteries, and afterwards only common stone-ware was made.

Many examples of Lambeth delft ware will be found in the collection, but they are placed with the other specimens of delft from various localities on the bottom shelf of the range of Wall-cases, and are referred to at p. 172. The pieces, marked X. 24 to 27, simply show the character of the brown stone-ware manufactured at Lambeth at a comparatively recent period. The mug, X. 24, is stamped "Stephen Green, Lambeth; and the Reform bottle, X. 25, with effigy of Lord Brougham, is stamped "Doulton & Watts, Lambeth Pottery."

---

### *Lambeth Ornamental Stoneware, &c.*

Within the last 20 years Sir Henry Doulton has developed at the Lambeth Potteries an entirely new branch of manufacture. The salt-glazed stoneware, which had previously been limited to the formation of vessels comparatively rude in type, and used principally for chemical and sanitary purposes, is now successfully applied to the production of objects of a highly artistic character, which have become famous as "Doulton ware." A large selection of specimens illustrates the variety and originality of decoration applied to this well-known material.†

Many of the specimens of this ornamental stoneware are decorated in *sgraffito* style, the outlines being scratched in the paste, and the incisions filled in with blue glaze. Some clever sketches of animals, executed in this style by Miss Hannah B. Barlow, are seen on the pieces X. 28 to 30: whilst the two following specimens illustrate the work of Mr. George Tinworth, a deaf and dumb artist who has since acquired high reputation.

---

\* The following advertisement is quoted from Felix Farley's Bristol Journal, 11th May 1776:—

"Wanted in Griffith and Morgan's Pot-house, Lambeth, near London, a Stone Kiln burner, also a top-ware turner and an ingenious painter. These men must understand their Business well, as the Company have indifferent hands enough already.

625 "They are desired not to leave Bristol till they have wrote to the Company and had their answer."

† For further information on the ornamental stoneware of Lambeth, the visitor may be referred to a paper "On some recent inventions and applications of "Lambeth stoneware, terra-cotta, and other pottery for internal and external "decoration," by John Sparkes. *Journal of the Society of Arts*, vol. xxii., No. 1119, May 1, 1874, p. 557. It was under the artistic superintendence of Mr. Sparkes, at that time master of the Lambeth School of Art, that this manufacture was originally developed.

In addition to the decorative *stone-ware*, there are in the collection examples of several other kinds of art pottery from Lambeth, such as the *Faïence*, which is coated with a lead-glaze applied after the design has been painted on the biscuit-ware; the *Impasto*, in which the effect is obtained by the use of coloured slips laid on to the clay while still soft; and the *Silicon ware*, which is described as "a vitrified stoneware impregnated with metallic oxides throughout its mass, and coated with a " 'smear,' or semi-glaze."\*

---

### DELFT WARE (*British and Foreign*).

[Wall-cases XXXV. to XLIV.; bottom shelves.]

It is said that as early as the year 1310 the manufacture of pottery was successfully carried on at Delft in Holland—a town which in the 17th century acquired extraordinary reputation by this industry. The famous Delft ware was made from clay obtained in the neighbourhood of Maestricht, mixed with marl and sand, and was coated with an opaque stanniferous glaze or enamel, frequently presenting a slight greenish or blueish tint.

The evidence already adduced with respect to the Lambeth pottery (p. 169) shows that in the middle of the 17th century—a period when the Delft manufacture had attained its greatest prosperity—certain Dutch potters established themselves in this country; and, following up the history a few years, we learn, from the preamble to a patent granted in 1676, that a Dutch potter, encouraged by the British ambassador at the Hague, had settled here with the view of pursuing his "Art of makeing tiles and porcelane and other earthen wares *after the way practised in Holland*."† From the success which attended the manufacture of Delft ware at Lambeth, the art extended to other localities, and was certainly carried on at Fulham, Liverpool, and Bristol. The want, however, of sufficient means of distinction between the wares made at these several places frequently renders it difficult, and sometimes indeed impossible, to satisfactorily refer pieces of English Delft to their respective localities, or even to separate the British from the foreign specimens.

---

\* "Some Developments of English Pottery during the last Fifty Years," a lecture by Sir Henry Doulton, delivered at the Royal Institution on Feb. 17, 1888. *Proc. Roy. Inst.*, vol. xii, 1889 p. 212.

† Specification of Patents, No. 191, Oct. 27, 1676.

Many of the pieces of Delft ware in the collection are interesting



FIG. 132.

for sake of the dates and inscriptions which they bear. The earliest dated specimen is a barrel-shaped mug, Y. 11. (Fig. 132), painted in blue, with birds, insects, and flowers, and inscribed around the rim "WILLIAM AND "ELIZABETH BVRGES, 24th "AVGVST, 1631"; also dated under the handle 1632.

The white-glazed surface of this piece has a peculiar granular appearance, unlike that of any of the other pieces of Delft ware in the collection, and somewhat resembling that of a salt-glazed surface. It is, nevertheless, believed to be of Lambeth manufacture.

The glaze on the indubitable Lambeth Delft is usually very white and opaque, as is excellently shown in some of the specimens here exhibited, such as the well-known wine jugs, Y. 1 to 3. These wine pots usually have a globular body, with a narrow neck, but no spout, and are furnished with a handle. Many have the name of the wine and a date written in blue across the belly of the jar. The specimen Y. 1 is not inscribed, but is mounted in pewter, the lid being stamped with the Tudor rose and crown, and initials "H.G." Y. 1a is inscribed "SACK, 1646"; Y. 2 bears the inscription "WHIT, 1647," and Y. 3 is marked "CLARET, 1662."

The candlestick, Y. 5, is painted in blue with the arms of the Fishmongers' Company, and inscribed "W. W. E., 1648." This ware so closely resembles that of the wine pots that it must be referred to the same manufactory.

The pill-slabs, Y. 6 and 7, and the drug-pot, Y. 8, are interesting relics of the apothecary's art. The slabs are painted in blue, with the arms of the Apothecaries' Company, and the motto, "Opifer que per orbem dicor." They were formerly used by apothecaries in rolling the materials of pills. It is to be noted that the glaze on these slabs is of a much less opaque white colour than that on the preceding pieces, and their attribution to Lambeth, though probable, is open to some doubt.

Many of the curious caudle-cups and puzzle-pots to be found in collections of Delft ware are generally regarded as undoubted productions of the Lambeth works. The two-handled caudle-pot and cover, Y. 4, presented by Mr. J. F. Walker, M.A., may be noted for the pinkish tint on parts of the glaze. The puzzle-pot, Y. 12, which has a false bottom enclosing a cavity which communicates with three tubular handles, is inscribed with the initials "C. T. E." and date 1684.

The next specimen, Y. 13, is a caudle-pot inscribed on the base "H. H. K., 1696." The large dish, Y. 35, is painted in blackish blue with the arms of the city of London, inscribed "ANNO 1654, LONDE."

Of Bristol Delft, an undoubtedly genuine specimen has already been figured and described (p. 136). Few pieces are so well authenticated as this Edkins plate, but it is believed that the specimen Y. 18, and probably some of the adjacent pieces, may also be safely attributed to Bristol. Y. 18 is a covered tankard, painted in blue with a landscape, and dated at the base of the handle 1758; the cover is ornamented with a portrait of Queen Anne, and is inscribed inside "L. C. Pope, 1758."

The flat bottle, Y. 19, with ring-shaped body, is inscribed "James and Ann Tompson, 1784." A balloon in purple and yellow forms a prominent object in the landscape painted on this piece.\*

An interesting series of Delft punch-bowls will be found in the collection. Most of these are attributed to Liverpool, and have already been described (p. 156). The bowl, S. 10, is regarded, however, by Prof. Church† as being more probably of Bristol manufacture, since its inscription refers to a locality in Cornwall, suggesting an origin in the West of England. It bears on the inside, painted in blue, the following verses:

" John Udy of Luxillion  
 " his tin was so fine  
 " it glidered this punch bowl  
 " and made it to shine  
 " pray fill it with punch  
 " lett the tinnars sitt round  
 " they never will budge  
 " till the bottom they sound.  
 " 1731."‡

The punch-bowl, Y. 23, is coated with a greenish glaze, and painted in pale blue on the outside with hunting scenes, and on the inside with a portrait surrounded by military trophies, and the following inscription:—

" William, the Princely Youth, with Transport see,  
 " He chains th' Oppressor, sets th' Oppressed Free,  
 " Hail Friend of Albion and of Liberty!"

A fine series of Delft dishes, coarsely painted with portraits of English Kings and Queens, is placed on the bottom shelf of the

\* The earliest balloon ascents were made in France in 1783, and Lunardi's first ascent in this country took place on September 21st, 1784.

† "English Earthenware: South Kensington Museum Art Handbooks." Part II., p. 70.

‡ These verses have allusion to the use of Cornish tin, which, in the form of binoxide, is employed in the preparation of the brilliant opaque white enamel of Delft ware. *Udy* is a common Cornish name, and *Luxillion* is a parish about three miles from Lostwithiel. The old verb *glidder*, which occurs in the third line, signifies "to glaze"; thus in *The Devil is an Ass* Ben Jonson writes, "keep it in your galley-pot well *gliddered*."

range of Wall-cases, XXXIX. to XLIV. Such platters are commonly attributed to Lambeth, but it has been suggested that they are more likely to be old Staffordshire ware. The specimens here exhibited bear rude portraits, mostly full length, of Charles II.; Charles II. and Queen Catherine of Braganza; James II.; William III.; Mary, the Queen of William III.; William and Mary; and Queen Anne.

The important piece, Y. 49, evidently a copy from Palissy, is assigned to Lambeth. It is a large oval dish painted in pale blue; the centre ornamented in low relief with a recumbent nude female figure surrounded by five amorini; the border sunk in eight wells or godets, alternately circular and oval, painted with birds and flowers, and separated by baskets of flowers, and masks in relief; inscribed "H. T. T., 1697." A similar specimen is in the British Museum.

It is probable that to Lambeth may also be attributed the dish Y. 34, which differs from most other pieces in being painted in colours. The colours are blue, green, yellow, orange, and purple; the subject is Christ and His Disciples on the road to Emmaus; above the figure of Christ is a bird symbolizing the Holy Spirit, and in the clouds the word GOD; the piece is dated 1653, in blue on quatrefoil in foreground.

The dish Y. 33, rudely painted in colours with the Crucifixion, is known to have been in use in Suffolk at an early date. Owing to the ready means of intercourse between Holland and our eastern sea board, large quantities of Dutch Delft were imported during the 17th and 18th centuries into Harwich, Yarmouth, Hull, and other eastern ports. It is probable that many, and certain that some, of the specimens of Delft ware in this collection are of Dutch manufacture; this remark applies especially to such pieces as the plates Y. 24 to 27.

A fine series of coloured illustrations of English Delft, with reproductions of a large number of inscriptions and dates on such ware, will be found in the recently-published work of Mr. and Miss Hodgkin.\*

### BELLEEK PORCELAIN (IRELAND), &C.

[Wall-cases XLI. to XLIII.]

The occurrence of large quantities of felspar in the neighbourhood of Belleek, near Lough Erne, in County Fermanagh, led some years ago to the establishment of porcelain works in this locality. Prior to the Dublin Exhibition of 1853, Mr. Kerr, of the china factory at Worcester, and Mr. Armstrong, of London, made a tour through Ireland for the purpose of discovering

---

\* "Examples of Early English Pottery, named, dated, and inscribed." By John Eliot Hodgkin, F.S.A., and Edith Hodgkin. London, 1891.



materials suitable for the manufacture of pottery and porcelain. The materials thus obtained served for the production of the celebrated service designed from subjects in "The Midsummer Night's Dream," and displayed in the Dublin Exhibition. In consequence of the exhibition of this service, attention was called to the existence at Belleek of felspar, as well adapted to the purposes of the potter as that imported from Sweden or Norway; and a manufactory was accordingly established, in 1857, under the direction of Mr. Armstrong. The china-clay employed was imported from Cornwall.

The nacreous lustre seen on much of the ware is due to the use of a preparation similar to that patented by Brianchon, and formed of salts of bismuth mixed with resin and oil of lavender, and coloured by certain metallic oxides. (*See* p. 63.)

The small series of specimens, Z. 1 to 13, sufficiently illustrates the productions of the Belleek factory. Many of the ornamental pieces are characterized by careful modelling from natural objects, such as shells, coral and sea-weed. The Paper Nautilus, or Argonaut shell, Q. 12, is notable as a faithful copy of an object of extreme delicacy.

---

#### PORTO-BELLO POTTERY.

An earthenware figure of a Highlander, made at the Porto-Bello pottery, near Edinburgh, and presented by Archibald H. Dunbar, Esq., is the only representative of the ceramic industry of Scotland which the Museum at present possesses.

---

#### FOREIGN POTTERY AND PORCELAIN.

(*Ancient and Modern.*)

[Cases on both sides of the lower gallery; Oriental porcelain in Pedestal Case 5].

Although the main object kept in view in forming the Ceramic Collection in this Museum has been the illustration of the history and present condition of the manufacture of pottery and porcelain in this country, it has nevertheless happened that a few samples of foreign wares, mostly presentations, have from time to time been introduced into the Collection. The foreign department thus formed is, however, necessarily incomplete; nor is it considered desirable to attempt any extension of the collection in this direction. It is, perhaps, sufficient, therefore, to merely indicate the position of the foreign series, without introducing any descriptive notices, which would indeed fall beyond the scope of this work, professedly a hand book of British pottery and porcelain.

---

## INDEX.

	PAGE.		PAGE.
Acetabula, Roman - - -	69	Branksea pottery - - -	166
Adams' ware - - -	107	Bricks, Babylonian - - -	40
Adobes - - -	2, 8	Bricks, Egyptian - - -	1
Agate ware - - -	93	Bricks, Roman - - -	78
Alhanubra tiles - - -	50	Brislington ware - - -	139
Analysis of—		Bristol delft - - -	136
Berlin porcelain - - -	34	Bristol porcelain - - -	131
Bow - - -	35	British pottery, ancient - - -	63
Bristol - - -	35	Buen Retiro porcelain - - -	14
Chelsea - - -	35	Butter pots - - -	87
China clay - - -	27		
China stone - - -	29	Cadborough pottery - - -	165
Chinese porcelain - - -	11	Cadogans - - -	140
Clays - - -	27	Cambrian pottery - - -	148
Delft ware - - -	54	Cameos, Wedgwood - - -	105
Della Robbia ware - - -	54	Cannon Street section - - -	67
Dresden porcelain - - -	34	Capo di Monte china - - -	14
Fulham ware - - -	35	Carclazyte - - -	29
Greek glaze - - -	41	Castleford pottery - - -	154
Greek pottery - - -	8	Castor ware - - -	70
Green mediæval glaze - - -	85	Caughley ware - - -	146
Majolica ware - - -	54	Cauliflower ware - - -	94
Palissy ware - - -	54	Chaffers collection - - -	67, 83
Roman frit - - -	72	Chamberlain's porcelain - - -	145
Samian ware - - -	65	Champion, R. - - -	131
Sèvres porcelain - - -	33	Chelsea porcelain - - -	16, 117
Anchor, as a mark - - -	121	Chelsea-Derby porcelain - - -	123
Anglo-Saxon pottery - - -	82	Chert - - -	30
Aretine ware - - -	66, 82	China clay - - -	4, 25
Assyrian glazes - - -	40	China stone - - -	28, 29
Astbury's ware - - -	96	Chinese glazes - - -	55
Atkinson, Professor - - -	11	Chinese porcelain - - -	9
Aylesford, late Celtic pottery - - -	64	Church, Professor, quoted - - -	11, 16, 34, 99, 120, 134, 178
		Cinerary urns - - -	64
Babylonian glazes - - -	40	Clays - - -	4, 27
Baguley's parian - - -	112	Coalbrook Dale ware - - -	147
Bailey, Mr., of Fulham - - -	15, 167	Coalport ware - - -	147
Bamboo ware - - -	102	Cob walls - - -	2
Barberini vase - - -	104	Collins, J. H., quoted - - -	5, 26, 29
Basaltes, Wedgwood's - - -	103	Cologne ware - - -	86, 168
Bellarmines - - -	86	Colour of clays - - -	22
Belleek porcelain - - -	174	Colours, pottery - - -	58
Bemrose, W., Derby porcelain - - -	122	Combed ware - - -	93
Berlin glaze - - -	55	Contraction of clays - - -	21
Berlin porcelain - - -	14	Cookworthy, W. - - -	18, 127
Billingsley - - -	127, 149, 150	Copeland's ware - - -	110
Binns, Mr., quoted - - -	142	Cornish clay - - -	4, 25
Biscuit ware - - -	31	Cornish stone - - -	28
Bishop's Waltham ware - - -	166	Craft's bowl - - -	114
Bone, H., enameller - - -	132, 135	Crouch ware - - -	96
Bone-earth - - -	16, 17		
Boote's parian - - -	112	Daubrée, M. - - -	5
Böttcher's ware - - -	13	Davenport ware - - -	107
Bovey clay - - -	6, 27	Delft ware - - -	54, 136, 156, 171
Bow porcelain - - -	16, 113	De Morgan's lustres - - -	62
Brancas-Lauraguais - - -	15, 17		

	PAGE.		PAGE.
D'Entrecolles - - -	10	Lambeth delft - - -	169
Derby porcelain - - -	122	Lambeth pottery - - -	169
Dip ware - - -	32	Lambeth, Doulton ware - - -	170
Dobies - - -	2	Lamps, Roman - - -	77
Don pottery - - -	154	Lead glazes - - -	47
Doulton ware - - -	170	Leeds pottery - - -	151
Dresden china - - -	13	Liverpool pottery - - -	155
Dresden glaze - - -	55	London, Roman ware from - - -	67
Dupont, M. - - -	2	Lowesby pottery - - -	163
Durobrivian ware - - -	70	Lowestoft pottery - - -	164
Dwight, John - - -	15, 167	Luca della Robbia - - -	50
Edkins plate - - -	136	Lustres - - -	51, 61, 139
Egyptian bricks - - -	1	Macadam, Professor - - -	26
Egyptian glazes - - -	37, 39	Majolica ware - - -	50
Egyptian ware, Wedgwood's - - -	103	Manufacture of earthenware - - -	30
Elers' ware - - -	94	Manufacture of porcelain - - -	33
Elizabethan ware - - -	96	Mason's ware - - -	108
Encaustic tiles - - -	48, 86	Maspero, Professor, quoted - - -	1
Evans, A. J., on Aylesford pottery - - -	64	Maw, Mr. G., quoted - - -	7, 19, 20
Felspars - - -	4	Maw's majolica - - -	147
Felspathic glazes - - -	55	Mayer's ware - - -	107
Ferrybridge pottery - - -	154	Mediaeval pottery - - -	83
Fifield, W. - - -	138	Medway pottery - - -	74
Flints - - -	29	Meissen porcelain - - -	12
Florentine porcelain - - -	12	Mezza majolica - - -	51
Foot, as potter's mark - - -	69	Minton's ware - - -	110
Foreign pottery - - -	175	Morgan, Mr. W. de, on lustres - - -	62
Franks, Mr. A. W. - - -	10, 118, 155	Mortaria - - -	69, 76
Frog mugs - - -	161	Mortlake pottery - - -	168
Fulham pottery - - -	15, 167	Mugs, old English - - -	158
Gardner, J. S., on clays - - -	7, 19	Nantgarw porcelain - - -	150
Glazes - - -	36	Neale's ware - - -	107
Gloss-kiln - - -	32	Neolithic pottery - - -	3
Goat-and-bee mugs - - -	117	New Canton - - -	114
Gombroon ware - - -	12	New Forest ware - - -	74
Goss's ivory porcelain - - -	111	New Hall china - - -	109, 132
Goss's parian busts - - -	112	Newcastle pottery - - -	159
Grainger's Worcester - - -	146	Nottingham earthenware - - -	162
Granite ware - - -	102	Nymphenburg porcelain - - -	14
Graybeards - - -	86	Onyx ware - - -	102
Greek glazes - - -	41	Opaque china - - -	148
Greenwell, Canon - - -	4, 64	Owen, Mr. Hugh - - -	18, 129, 131, 139
Hannay's analyses - - -	29	Palissy ware - - -	53
Hard paste defined - - -	15	Palmer's ware - - -	107
Herculanum pottery - - -	158	Pardoe, Thomas - - -	138
Höchst porcelain - - -	14	Parian ware - - -	111, 125
Hodgkin, Mr. and Miss, on old English pottery - - -	85, 91, 174	Petuntse - - -	10
Indian enamels - - -	41	Petuntzyte - - -	29
Irish porcelain - - -	174	Pie crust ware - - -	102
Ironstone china - - -	108	Pine apple ware - - -	94
Isleworth pottery - - -	169	Pinxton porcelain - - -	127
Jackfield pottery - - -	146	Pitt-Rivers, General - - -	66, 74
Japanese porcelain - - -	11	Place's ware - - -	155
Jasper ware - - -	101, 104	Plymouth porcelain - - -	127
Jewitt, Mr. Llewellyn - - -	64, 122, 152	Poole clay - - -	6, 27
Julien, Stanislas, quoted - - -	10	Portland vase - - -	104
Kaolin - - -	4, 18, 25	Porto Bello ware - - -	175
Kaolinite - - -	5	Potter's wheel - - -	35
		Purple of Cassius - - -	61
		Queen's ware - - -	100, 101
		Raw materials - - -	19

	PAGE.		PAGE.
Rhenish pottery - - -	79	Tiles, Roman - - -	78
Rix, Mr. W. P., on glazes - - -	37	Tin glazes - - -	49
Rockingham ware - - -	140	Tithe mugs - - -	158
Roman pottery - - -	64	Toad mugs - - -	158
Rose's felspathic glaze - - -	56, 147	Tuft ware - - -	92
		Tortoiseshell ware - - -	93
Sack-pots - - -	172	Toys, Roman - - -	77
Sadler, engraver - - -	156	Turner's ware - - -	106
Saggers - - -	31	Twyford's ware - - -	106
St. Petersburg porcelain - - -	14	Tygs - - -	90
Salopian ware - - -	146		
Salt glaze - - -	57, 96	Unaker - - -	16, 114, 115
Salvétat, M. - - -	8, 41, 56	Upelurch pottery - - -	74
Samian ware - - -	64, 66		
Saxon porcelain - - -	12	Vauxhall pottery - - -	169
Sèvres glazes - - -	56	Venetian porcelain - - -	12
Sèvres porcelain - - -	14	Vestorian blue - - -	39
Shrinkage of clays - - -	21	Vienna porcelain - - -	14
Shropshire porcelain - - -	146	Vogt, M. G., quoted - - -	11
Silicon ware - - -	171	Voyez jug - - -	107
Simpson, Mr. W., quoted - - -	2		
Slip ware - - -	91	Wall, Dr., Worcester - - -	142
Smearing - - -	58	Watcombe terra-cotta - - -	166
Soapstone - - -	7	Weathering of clays - - -	20
Solon, M., on Old English pottery - - -	91	Wedgwood, Josiah - - -	100
Spode ware - - -	108	Wedgwood cameos - - -	105
Staffordshire pottery - - -	87	Wedgwood porcelain - - -	105
Steatite - - -	7	Wedgwood ware - - -	100
Stourbridge clay - - -	28	Wheel, potter's - - -	35
Sunderland pottery - - -	160	Willett collection - - -	91
Sun-dried bricks - - -	1, 8	Wood, Enoch - - -	106
Swansea porcelain - - -	148	Worcester porcelain - - -	142
		Worth, Mr. R. W., quoted - - -	18, 128, 131
Teignmouth clay - - -	6, 27	Wrotham ware - - -	91, 165
Tickenhall pottery - - -	91		
Tiles, lead-glazed - - -	48	Yarmouth pottery - - -	164
Tiles, Liverpool - - -	157		

# GENERAL MEMOIRS OF THE GEOLOGICAL SURVEY.

- REPORT ON CORNWALL, DEVON, and WEST SOMERSET. By Sir H. T. DE LA BECHE. 14s. (O.P.)
- FIGURES and DESCRIPTIONS of the PALÆOZOIC FOSSILS in the above Counties. By PROF. PHILLIPS. O.P.)
- MEMOIRS of the GEOLOGICAL SURVEY of GREAT BRITAIN. Vol. I., 21s.; Vol. II. (in 2 Parts), 42s.
- WALES. By SIR A. C. RAMSAY, App., by J. W. SALTER and R. ETHERIDGE. 2nd Ed. 21s. (Vol. III. of Memoirs, &c.)
- ONDON BASIN. Pt. I. Chalk & Eocene of S. & W. Tracts. By W. WHITAKER. 13s. (Vol. IV. of Memoirs, &c.) (O.P.)
- GUIDE to the GEOLOGY of LONDON and the NEIGHBOURHOOD. By W. WHITAKER. 5th Ed.
- TERTIARY FLUVIO-MARINE FORMATION of the ISLE of WIGHT. By EDWARD FORBES. 5s.
- the ISLE of WIGHT. By H. W. BRISTOW. New Ed. By C. REID and A. STRAHAN. 8s. 6d.
- the WEALD (PARTS of the COUNTIES of KENT, SURREY, SUSSEX, and HANTS). By W. TOPLEY. 17s.
- the TRIASSIC and PERMIAN ROCKS of the MIDLAND COUNTIES of ENGLAND. By E. HULL. 5s.
- the FENLAND. By S. B. J. SKERTCHLY. 36s. 6d.
- the MANUFACTURE of GUN FLINTS. By S. B. J. SKERTCHLY. 16s.
- the SUPERFICIAL DEPOSITS of SOUTH-WEST LANCASHIRE. By C. E. DE RANCE. 10s. 6d.
- ORTH DERBYSHIRE. By A. H. GREEN, C. LE NEVE FOSTER, and J. R. DAKYNS. 2nd Ed. By A. H. GREEN and A. STRAHAN. 5s. 6d.
- URNLEY COAL FIELD. By E. HULL, R. H. TIDDEMAN [and Others]. 12s.
- ORKSHIRE COALFIELD. By A. H. GREEN, R. RUSSELL [and Others]. 42s.
- AST SOMERSET and BRISTOL COALFIELDS. By H. B. WOODWARD. 18s.
- OUTH STAFFORDSHIRE COAL-FIELD. By J. B. JUKES. (3rd Edit.) (*Out of print.*) 3s. 6d.
- WARWICKSHIRE COAL-FIELD. By H. H. HOWELL. 1s. 6d.
- ICEISTERSHIRE COAL-FIELD. By EDWARD HULL. 3s.
- RUPTIVE ROCKS of BRENT TOR. By F. RUTLEY. 15s. 6d.
- ELSTIC LAVAS of ENGLAND and WALES. By F. RUTLEY. 9d.
- OLDERNES. By C. REID. 4s.
- the PLOCENE DEPOSITS of BRITAIN. By C. REID. 5s. 6d.
- the JURASSIC ROCKS of BRITAIN.—Vol. I. YORKSHIRE, 8s. 6d., Vol. II. YORKSHIRE, Fossils, 12s. By C. FOX-STRANGWAYS. Vol. III. LIAS of ENGLAND (Yorkshire excepted). By H. B. WOODWARD.
- BRITISH ORGANIC REMAINS. DECADES I. to XIII., with 10 Plates each. Price 4s. 6d. each 4to; 2s. 6d. each 8vo.
- ONOGRAPH I. On the Genus PTERYGOTUS. By T. H. HUXLEY, and J. W. SALTER. 7s.
- ONOGRAPH II. On the Structure of the BELEMNITIDÆ. By T. H. HUXLEY. 2s. 6d.
- ONOGRAPH III. On the CROCODILIAN REMAINS found in the ELGIN SANDSTONES. By T. H. HUXLEY.
- ONOGRAPH IV. On the CHIMEROID FISHES of the British Cretaceous Rocks. By E. T. NEWTON. 5s.
- the VERTEBRATA of the FOREST BED SERIES of NORFOLK and SUFFOLK. By E. T. NEWTON. 7s. 6d.
- the VERTEBRATA of the PLOCENE DEPOSITS of BRITAIN. By E. T. NEWTON. 4s.
- Museum Catalogues, &c.:—GUIDE to the MUSEUM of PRACTICAL GEOLOGY (Geological Survey, School of Mines, Mining Record Office). By R. HUNT and F. W. RUDLER. (3rd Ed.) 6d. (O.P.)
- ROCK SPECIMENS. By A. C. RAMSAY, H. W. BRISTOW, H. BAUFERMAN, and A. GEIKIE. 1s. (
- HANDBOOK to the COLLECTION of BRITISH POTTERY and PORCELAIN.
- FOSSILS:—CAMBRIAN and SILURIAN, 2s. 6d.; CRETACEOUS, 2s. 9d.; TERTIARY and POS

## SHEET MEMOIRS OF THE GEOLOGICAL SURVEY.

Those marked (O.P.) are Out of Print.

- 2, 7 - GEOLOGY of LONDON, &c. By W. WHITAKER. Vol. I., 6s. Vol. II., 5s.
- 2 - FOLKESTONE and RYE. By F. DREW. 1s.
- 2 - S. BERKSHIRE, and N. HAMPSHIRE. By H. W. BRISTOW and W. WHITAKER.
- 3 - PARTS of OXFORDSHIRE and BERKSHIRE. By E. HULL and W. WHITAKER.
- 4 - PARTS of WILTS and GLOUCESTERSHIRE. By A. C. RAMSAY, W. T. AVELINE.
- 4 - CHELTENHAM. By E. HULL. 2s. 6d.
- 4 - BANBURY, WOODSTOCK, and BUCKINGHAM. By A. H. GREEN. 2s.
- 5 SW - WOODSTOCK. By E. HULL. 1s.
- 5 - N.W. ESSEX & N.E. HERTS. By W. WHITAKER, W. H. PENNING, W. H. DALTON, &
- 5 SW - COLCHESTER. By W. H. DALTON. 1s. 6d.
- 5 SE - EASTERN END of ESSEX (WALTON NAZE and HARWICH). By W. WHITAKER.
- 5 NW, NE - IPSWICH, HADLEIGH, and FELIXSTOW. By W. WHITAKER, W. H. DALTON.
- 5, 50 SE - ALDBOROUGH, &c. By W. H. DALTON. Edited, with additions, by W. WHITAKER.
- 5 N - SOUTH WOLD. By W. WHITAKER. 2s. 6d.
- 5 SW - STOWMARKET. By W. WHITAKER, F. J. BENNETT, and J. H. BLAKE. 1s.
- 5 N - DISS, EYE, &c. By F. J. BENNETT. 2s.
- 5 NE - HALESWORTH and HARELESTON. By W. WHITAKER and W. H. DALTON. 1s.
- 1 SW - CAMBRIDGE. By W. H. PENNING and A. J. JUKES-BROWNE. 4s. 6d.
- 1 SE - RURY ST. EDMUNDS and NEWMARKET. By F. J. BENNETT, J. H. BLAKE, and
- 1 NE - PARTS of CAMBRIDGESHIRE and SUFFOLK. By W. WHITAKER [and Others].
- 3 SE - PART of NORTHAMPTONSHIRE. By W. T. AVELINE and RICHARD TRENCH.
- 3 NE - PARTS of NORTHAMPTONSHIRE and WARWICKSHIRE. By W. T. AVELINE.
- 3 SE - PART of LEICESTERSHIRE. By W. TALBOT AVELINE and H. H. HOWELL. 8s.
- 4 SE - RUTLAND, &c. By J. W. JUDD. 12s. 6d.
- 5 - S.W. NORFOLK and E. CAMBRIDGESHIRE. By W. WHITAKER, S. B. J. SKERTCHLY, and
- 6 NE, SE - NORWICH. By H. B. WOODWARD. 7s.
- 6 SW - ATTLEBOROUGH. By F. J. BENNETT. 1s. 6d.
- 6 NW - E. DEREHAM. By J. H. BLAKE. 1s. 6d.
- 7 - YARMOUTH and LOWESTOFT. By J. H. BLAKE. 2s.
- 7 E - CROMER. By C. REID. 6s.
- 8 NW, SW - PAKENHAM, WELLS, &c. By H. B. WOODWARD. 2s.
- 0 - S.W. LINCOLNSHIRE, &c. By A. J. JUKES-BROWNE and W. H. DALTON. 4s.
- 1 NE - NOTTINGHAM. By W. T. AVELINE. (2nd Ed.) 1s.
- 9 NW - RHYL, ALBERT, and COLWYN. By A. STRAHAN. (Notes by R. H. TIDDEMAN.) 1s. 6d.
- 9 SE - FLINT, MOLD, and RUTHIN. By A. STRAHAN (Parts by C. E. DE RANCE). 4s. 6d.
- 0 NW - PRESCOT, LANCASHIRE. By E. HULL. (3rd Ed. With additions by A. STRAHAN.) 3s.
- 0 NE - ALTRINCHAM, CHESHIRE. By E. HULL. 8d. (O.P.)
- 0 SW - CHESTER. By A. STRAHAN. 2s.
- 1 NW, SW - STOCKPORT, MACCLESFIELD, CONGLETON, & LEEK. By E. HULL and A. H. GREEN. 4s.
- 2 SE - PARTS of NOTTINGHAMSHIRE and DERBYSHIRE. By W. T. AVELINE. (2nd Ed.) 6d.
- 2 NE - PARTS of NOTTINGHAMSHIRE, YORKSHIRE, and DERBYSHIRE. By W. T. AVELINE. 8d.
- 3 - LINCOLN. By W. A. E. USSHER, A. J. JUKES-BROWNE, and A. STRAHAN. 3s.
- 4 - EAST LINCOLNSHIRE. By A. J. JUKES-BROWNE. 3s. 6d.
- 6 - N. LINCOLNSHIRE and S. YORKSHIRE. By W. A. E. USSHER [and Others]. 2s.
- 7 NW - PARTS of NOTTS, YORKSHIRE, and DERBYSHIRE. (2nd Ed.) By W. T. AVELINE. 6d.
- 7 SW - BARNSELEY. By A. H. GREEN. 9d.
- 8 SW - OLDHAM. By E. HULL. 2s.

- 88 SE - PART OF THE YORKSHIRE COAL-FIELD. By A. H. GREEN, J. R. DAKYNS and J. C. WARD. 1s.
- 88 NE - DEWSBURY, &c. By A. H. GREEN, J. R. DAKYNS, J. C. WARD and R. RUSSELL. 6d.
- 89 SE - BOLTON, LANCASHIRE. By E. HULL. 2s.
- 89 SW - WIGAN. By EDWARD HULL. (2nd Ed.) 1s. (O.P.)
- 90 SE - THE COUNTRY between LIVERPOOL and SOUTHPORT. By C. E. DE RANCE. 3d. (O.P.)
- 90 NE - SOUTHPORT, LYTHAM, and SOUTH SHORE. By C. E. DE RANCE. 6d.
- 91 SW - THE COUNTRY between BLACKPOOL and FLEETWOOD. By C. E. DE RANCE. 6d.
- 91 NW - SOUTHERN PART OF THE PURNESS DISTRICT in N. LANCASHIRE. By W. T. AVELINE. 6d.
- 92 SE - BRADFORD and SKIPTON. By J. R. DAKYNS, C. FOX-STRANGWAYS, R. RUSSELL, and W. H. DALTON.
- 93 NW - NORTH and EAST of HARROGATE. By C. FOX-STRANGWAYS. 6d.
- 93 NE - THE COUNTRY between YORK and MALTON. By C. FOX-STRANGWAYS. 1s. 6d.
- 93 NW - N. and E. of LEEDS, and near TADCASTER. By W. T. AVELINE, A. H. GREEN (and others). (O.P.)
- 94 SE 94 W - COUNTRY between YORK & HULL. By J. R. DAKYNS, C. FOX-STRANGWAYS, and A. G. CAMERON. 1s.
- 94 SE - DRIFFIELD. By J. R. DAKYNS and C. FOX-STRANGWAYS. 9d.
- 94 NE - BRIDDLINGTON BAY. By J. R. DAKYNS and C. FOX-STRANGWAYS. 1s.
- 95 SW, SE - SCARBOROUGH and FLAMBOROUGH HEAD. By C. FOX-STRANGWAYS. 1s.
- 95 SW - WHITBY and SCARBOROUGH. By C. FOX-STRANGWAYS and G. BARROW. 1s. 6d.
- 96 SE - NEW MALTON, PICKERING, and HELMSLEY. By C. FOX-STRANGWAYS. 1s.
- 96 NE - ESKDALE, ROSEDALE, &c. By C. FOX-STRANGWAYS, C. REIL, and G. BARROW. 1s. 6d.
- 96 NW, SW - NORTHERN PART OF THIRSK. By C. FOX-STRANGWAYS, A. G. CAMERON, and G. BARROW. 1s. 6d.
- 97 SW - INGLEDOROUGH. By J. R. DAKYNS, R. H. TIDDEMAN, W. GUNN, and A. STRAHAN. 2s.
- 97 NW - MALLERSTANG, with parts of WENSLEYDALE, SWALEDALE, and ARKENDALE.
- 98 SE - KIRKBY LONSDALE and KENDAL. By W. T. AVELINE, T. Mc K. HUGHES, and R. H. TIDDEMAN.
- 98 NE - KENDAL. By W. T. AVELINE and T. Mc K. HUGHES. 2nd Ed. By A. STRAHAN. 2s.
- 101 SE - NORTHERN PART OF THE ENGLISH LAKE DISTRICT. By J. C. WARD. 9s.
- 104 SW, SE - NORTH CLEVELAND. By G. BARROW. 1s. 6d.
- 108 SE - OTTERBURN and ELSDON. By HUGH MILLER. 2s. 6d.
- 108 NE - CHEVIOT HILLS. By C. T. CLOUGH. 1s. 6d.
- 110 SW - PLASHETTS and KIELDER. By C. T. CLOUGH. 1s.

**THE MINERAL DISTRICTS OF ENGLAND AND WALES.**

**COAL-FIELDS.**—Scale, one inch to a mile.

Anglesey, 78 (SW).  
 Bristol and Somerset, 19, 35.  
 Coalbrook Dale, 61 (NE & SE).  
 Clee Hill, 53 (NE, NW).  
 Flintshire and Denbighshire, 74 (NE & SE), 79 (NE, SE).  
 Derby and Yorkshire, 71 (NW, NE, & SE), 82 (NW & SW),  
 81 (NE), 87 (NE, SE), 88 (SE).  
 Forest of Dean, 43 (SE & SW).  
 Forest of Wyre, 61 (SE), 55 (NE).  
 Lancashire, 80 (NW), 81 (NW), 89, 88 (SW, NW).  
 Leicestershire, 71 (SW), 63 (NW).  
 Northumberland & Durham, 103, 105, 106 (SE), 109 (SW, SE).  
 N. Staffordshire, 72 (NW), 72 (SW), 73 (NE), 80 (SE), 81 (SW).  
 S. Staffordshire, 51 (NW), 62 (SW).  
 Shrewsbury, 60 (NE), 61 (NW & SW).  
 South Wales, 36, 37, 38, 40, 41, 42 (SE, SW).  
 Warwickshire, 62 (NE SE), 63 (NW SW), 54 (NE), 53 (NW).  
 Yorkshire, 88 (NE, SE), 87 (SW), 92 (SE), 93 (SW).

**COAL-FIELDS AND OTHER MINERAL DISTRICTS—**

Scale, six inches to a mile.

The Coal-fields and other mineral districts of the N. of England are published on a scale of six inches to a mile, to 6s. each. MS. Coloured Copies of other six-inch not intended for publication, are deposited for reference in the Geological Survey Office, 28, Jermyn Street, London.

**Lancashire.**

Sheet 15, Ireth—16, Ulverstone—17, Cartmel—22, Aldingham—47, Clitheroe—49, Colne—49, Laueshaw Br.—55, Whalley—56, Hargate—57, Winewall—61, Preston—62, Balderstone—63, Accrington—64, Burnley—65, Stipenden—69, Layland—70, Blackburn—71, Haslingden—72, Cliviger, Bacup—73, Todmorden—77, Chorley—78, Bolton-le-Moors—79, Entwistle—80, Tottington—81, Wardle—81, Ormskirk—85, Standish—86, Adlington—87, Bolton-le-Moors—88, Bury, Heywood—89, Rochdale, &c.—92, Bickerstaffe—93, Wigan—94, West Houghton—95, Radcliffe—96, Middleton, Prestwich—97, Oldham—100, Knowsley—101, Billinge—102, Leigh, Lowton—103, Ashley, Eccles—104, Manchester, Salford—105, Ashton-under-Lyne—106, Liverpool—107, Prescott—108, St. Helen's—109, Winwick—111, Cheedale—112, Stockport—113, Part of Liverpool.

**Durham.**

Sheet 1, Ryton—2, Gateshead—3, Jarrow—4, S. Shields—5, Greenside—6, Winton—7, Washington—8, Sunderland—9, Pt. of Hunstanworth—10, Edmondbyers—11, Ebchester—12, Tantoby—13, Chester-le-Str—15, Killhope Moor—16, Hunstanworth—17, Waskerley—18, Muggles-

**Durham—continued.**

wick—19, Lanchester—20, Hetton-le-Mole—22, Wear Head—23, Eastgate—24, Stanhope—25, Wolsingham—26, Bracepeth—30, Benny Seat—32, White Kirkley—33, Hasterley—34, Whitworth—38, Maize Beck—41, Cockfield—42, Bp. Auckland—46, Hawksley Hill Ho.—52, Barna Castle—53, Winstan.

**Northumberland.**

Sheet 44, Rothbury—45, Longframlington—46, Brothill—47, Coquet Island—54, Loughorsley—55, Ulgham—56, Druridge Bay—63, Netherwitton—64, Morpeth—Newbigin—72, Bedlington—73, Blyth—80, Cranlington—81, Earsdon—82, NE. of Gilsand—83, Coadley Gate—Heldson—88, Long Benton—89, Tynemouth—91, Greehead—92, Haltwhistle—93, Haydon Bridge—94, Hexham—95, Corbridge—96, Horsley—97, Newcastle—98, Walker—101, Whitfield—102, Allendale Town—103, Slayle—105, N. lands—106, Blackpool Br.—107, Allendale—108, Blanchian—109, Shotleyfield—110, Wellhope—111, 112, Allenheads.

**Cumberland.**

Sheet 24 (and 264) Kirkby Ravensworth—55, Searnses—58, Skiddaw—63, Thackthwaite—64, Keswick—65, Doo-  
 raye—69, Buttermere—70, Grange—71, Helvellyn—72, Wastwater—75, Stonethwaite Fell.

**Westmorland.**

Sheet 2, Tees Head—6, Dufton Fell—12, Patterdale—1, Near Grasmere—25, Grasmere—38, Kendal.

**Yorkshire.**

Sheet 3, Lune Forest—7, Redcar—8, 9, Saltburn, &c.—Cotherstone Moor—12, Bowes—13, Wycliffe—17, Gnisboro—20, Lythe—24, Kirkby Ravensworth—25, Aldborough—32, 33, Whitby—33, Marske—39, Richmond—46, Little Beck—47, Robin Hood's Bay—53, Downholme—68, Leybourne—82, Kidstones—84, E. Witton—97, Foxup—98, Kir Gill—99, Haden Carr—100, Lofthouse—115, Arncliffe—111, Conistone Moor—133, Kirkby Malham—152, Blubberhouses—184, Dale End—185, Kildwick—200, Keighley—201, Bingley—202, Calverley—203, Seacroft—204, Aberford—215, Pecke Well—216, Bradford—217, Calverley—218, Leeds—219, Kippax—231, Halifax—232, Birstal—233, East Ardsley—234, Castleford—246, Huddersfield—247, Dewsbury—248, Wakefield—249, Pontefract—250, Darrington—260, Honley—261, Kirkburton—262, Darton—263, Hemsworth—264, Campsall—272, Holmfirth—273, Penistone—274, Barnsley—275, Darfield—276, Brodsworth—281, Langwell—282, Wortley—283, Wath upon Dearne—284, Conisborough—287, Low Bradford—288, Ecclesfield—289, Rotherham—290, Bratcliffe—293, Hallam Moors—295, Handsworth—296, Loughton-en-le-Morthen—297, Walswood—300, Harthill.

**MINERAL STATISTICS.**

The produce of Coals, Metallic Ores, and other Minerals. By R. HUNT. From 1853 to 1857, inclusive, 1s. 6d. each. 1858, Part I, 1s. 6d.; Part II, 5s. 1859, 1s. 6d. 1860, 3s. 6d. 1861, 2s.; and Appendix, 1s. 1862, 2s. 6d. 1863, 2s. 6d. 1864, 2s. 1865, 2s. 6d. 1866 to 1881, 2s. each. (These Statistics are now published by the Home Office.)

**THE IRON ORES OF GREAT BRITAIN.**

Part I. The North and North Midland Counties of England (*Out of print*). Part II. South Staffordshire. Price 1s. Part III. South Wales. Price 1s. 3d. Part IV. The Shropshire Coal-field and North Staffordshire. 1s. 3d.









UNIVERSITY OF CALIFORNIA, LOS ANGELES  
THE UNIVERSITY LIBRARY  
This book is DUE on the last date stamped below

JAN 26 1953

REC'D LD-URL  
ORION  
LD/URL SEP 19 1989

JAN 5 1953

SEP 09 1989

LD-URL NOV 2 1966

4 WK AU

REC'D LD-URL  
LD-URL APR 16 1968

JUN 3 1968

REC'D LD-URL  
LD-URL

JUL 21 1967

REC'D LD-URL  
ORION NOV 30 1990  
LD/URL  
DEC 10 1990

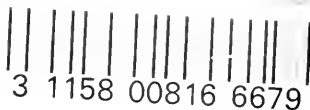
LD  
LD-URL NOV 20 1987

REC'D LD-URL  
LD-URL  
DEC 11 1987  
DEC 15 1987

UC SOUTHERN REGIONAL LIBRARY FACILITY



AA 000 607 358 9



3 1158 00816 6679



